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Golder Associates Inc.
CONSULTING ENGINEERS

Industri-Plex
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OU 01

SUPPLEMENTAL PRE-DESIGN INVESTIGATION OF THE ARSENIC PIT AND CHROMIUM LAGOONS

INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

Prepared for:

Industri-Plex Site Remedial Trust
800 North Lindbergh Boulevard
St. Louis, Missouri

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August 1991 893-6255

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As + Cr Results of As/Cr Special Study (August 1991)

	Dis. As (ppb)	Dis. Cr	pH	TOC	COD	NH_3
OW-43	60.1	< 4.3	6.4	16.6	51.7	1.2
OW-44	< 4.2	< 4.3	5.3	4.9	11.1	2.0
OW-45	999.0	< 4.3	7.7	32.1	91.8	37
OW-46	64.8	5.1	6.8	9.6	31.6	5.6
OW-47	338	< 4.3	6.5	17	50	10
OW-9	12.7	< 4.3	7.38 (7.6)	14.1 (38)	(62.1)(129)	< 2
OW-48A	657	< 4.3	6.4	17.4	50.3	10
OW-48	54.2	5.5	5.8	9	< 10	2.4
OW-49A	61.3	< 4.3	6.4	10.1	22.9	25
OW-49	35.8	< 4.3	6.6	3.8	10.4	1.9
OW-50A	10.8	< 4.3	6.1	8.9	24.7	17
OW-50	126	11.5	5.7	21	86	33
OW-18A	4.0	< 4.3	6.0	7.2	16.5	8.4
OW-18	2.3	< 4.3	6.0	6.1	11	22
OW-12	572	-	7.15 7.15	(29) 33	(144) 97	2.7
OW-14	35	-	5.85	(5.1) (7.65)	(< 20) (17)	1.1
OW-17	164	-	7.01	(160) (313)	(454) (1030)	280
OW-18	-		5.6	(5.1) (6.1)	(< 20) (11)	22
OW-18A			6.2	(5.5) (7.25)	52.3 (16.5)	8.4
OW-22			6.3	(11.5) (11.5)	(24) (55)	23
OW-37			(OW 37) - 6.09	(7.3) —	(24.4)	5.4
OW-58			(OW 58 - 5.78	(9.6)	(< 10)	1.4
OW-42			OW 42 - 6.8	8.5	(16.4)	1.7
			7.1		(100)	300

Golder Associates Inc.
CONSULTING ENGINEERS

August 2, 1991 Project No.: 893-6255

United States Environmental Protection Agency, Region I
J.F.K. Federal Building HRS-CAN-3
Boston, Massachusetts 02203-2211

Attn: Mr. Joseph DeCola
Remedial Project Manager

RE: SUPPLEMENTAL PRE-DESIGN INVESTIGATION ARSENIC PIT AND CHROMIUM LAGOONS, INDUSTRI-PLEX SITE

Gentlemen:

On behalf of the Industri-Plex Site Remedial Trust, we are submitting the attached Supplemental Pre-Design Investigation of the Arsenic Pit and Chromium Lagoons at the Industri-Plex Site in Woburn, Massachusetts. This report describes a program of monitoring well installation, groundwater sampling, and laboratory analysis conducted in accordance with the Work Plan previously submitted to the Agencies.

Very truly yours,

GOLDER ASSOCIATES INC.

P. Stephen Finn, C.Eng.
Project Manager

PSF/bjt
C:ARSCL

cc: W. Smull, ISRT
J. Naparstek, MDEP
A. Ostrofsky, NUS
D. Baumgartner, ISRT

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C:ARS81TCF

1.0 INTRODUCTION

A hydrogeologic investigation was performed in order to assess if the Arsenic Pit and Chromium Lagoons are influencing the mobility of selected trace metals in groundwater. The investigation included the installation of eleven new monitoring wells, water level measurements in existing monitoring wells, and groundwater sampling/ analysis for monitoring wells near the Arsenic Pit and Chromium Lagoons as approved in the Work Plan (Golder Associates Inc., 1991a). The investigation was performed in accordance with the procedures presented in the Work Plan (Golder Associates Inc., 1991a).

This report presents a description of the hydrogeologic investigation, including the methods used and results obtained, along with an evaluation of the potential influence of the Arsenic Pit and the Chromium Lagoons on the mobility of selected trace metals. A revised monitoring well location map and cross-sections showing the concentrations of dissolved arsenic and chromium in samples from the vicinity of the Arsenic Pit and Chromium Lagoons are also included. Appendices to this report contain supporting documentation including borehole logs, well construction logs, and data validation/assessment records.

2.0 METHOD OF INVESTIGATION

2.1 Monitoring Well Installation

Eleven new monitoring wells were installed during this investigation. The locations are shown on Figure 1 and are designated OW-43, OW-44, OW-45, OW-46, OW-47, OW-48, OW-48A, OW-49, OW-49A, OW-50, and OW-50A. Shallow/deep well pairs were installed in the unconsolidated aquifer at locations OW-48, OW-49, and OW-50 south of the Chromium Lagoons. The shallow wells are designated by the suffix "A".

Drilling was performed in accordance with the Technical Procedures given in Appendix A. The monitoring wells were installed using hollow stem auger drilling equipment which was steam cleaned prior to use at each borehole. Split spoon samples were taken every five feet ahead of the augers. All split spoon samples were logged by a Golder geologist, and representative samples were placed in labeled jars and retained for reference. Running sands, which were encountered during drilling, were controlled by adding City of Woburn water to the borehole. The boreholes were advanced to auger refusal, and the monitoring wells were constructed through the hollow stem of the augers.

The saturated thickness of the unconsolidated aquifer was determined during drilling by a Golder Associates geologist. When the saturated thickness of the unconsolidated aquifer exceeded 30 feet, two wells were installed, in accordance with the Work Plan. When two wells were installed, one well was screened near the top of the unconsolidated aquifer, and the second at the base of the unconsolidated aquifer. At locations where a single well was installed, the screen was located in the most permeable zone based on visual estimation of the aquifer gradation as determined from split spoon samples. Soil

boring logs and well construction diagrams are given in Appendices B and C, respectively, and summarized in Table 1.

The monitoring wells were constructed of four-inch diameter Schedule 40 PVC with 0.010-inch factory slotted screen, and four-inch diameter Schedule 40 PVC flush-threaded casing. The well screen was 10 feet in length, except where the saturated thickness of the unconsolidated aquifer was less than twelve feet (OW-43, OW-46 and OW-47) where a five-foot screen was installed. A sand pack of number 20 Ottawa sand was placed around the screens, and extended above the screen a distance of at least two feet. A seal of bentonite pellets/chips was placed above the sand pack to prevent grout from entering the sand pack. Bentonite grout was then placed in the annular space to approximately two feet below ground surface using the tremie method. A six-inch diameter, five-foot long, steel protective casing was fitted over the well, and set in concrete. The protective casing was secured with a locking lid, and both lid and casing were marked with the well designation.

The top of the PVC casing was notched to provide a consistent measuring point, and the elevation and horizontal coordinates of this point were surveyed by a surveyor licensed in the Commonwealth of Massachusetts. The survey data are summarized in Table 1. A revised monitoring well location map for the Site is given in Figure 1.

The monitoring wells were developed using a submersible pump, a centrifugal pump, or a Waterra foot valve pump as appropriate to the recovery rate of the well. A new piece of polypropylene tubing was used during development of each well. At a minimum, a volume of water equal to that which

was introduced during drilling, or three casing volumes (whichever was greater), was removed during development. In accordance with the Work Plan, the wells were developed until they were as free and clear of sediment as possible, and field parameters (pH and conductivity) had stabilized. Well development documentation is included in Appendix D.

A complete round of synoptic water level measurements was taken for on-Site monitoring wells after all the wells were developed. These data are summarized on Table 2.

All groundwater removed during development was collected in a 250-gallon truck-mounted tank and transported to the holding tanks at the decontamination pad for temporary storage. In accordance with the Work Plan, all soil cuttings from drilling operations conducted outside of the fenced area of the Site were transported back to the decontamination pad and placed in a designated on-Site area.

All field activities were performed in accordance with the Golder Associates Inc. Health and Safety Plan included in the Work Plan. During drilling, ambient air quality was monitored by the Site Health and Safety Officer, or his appointed representative.

2.2 Groundwater Sampling and Analysis

Sampling of the eleven new monitoring wells, as well as eleven previously installed wells (OW-9, OW-12, OW-14, OW-17, OW-18, OW-18A, OW-22, OW-37, OW-38, OW-40, and OW-42), was performed between April 11 and April 18, 1991. Ground water samples were collected in accordance with the Work Plan Technical Procedures which are included as Appendix A. Prior to sampling, the depth to water in each well was measured. All wells were purged by removing a minimum of

three casing volumes of water prior to sampling. Samples were collected using disposable Teflon bailers and laboratory-supplied sample bottles which were labeled with a unique sample identification number.

Samples were collected for Contract Laboratory Program-Routine Analytical Services (CLP-RAS) total and dissolved Target Analyte List (TAL) metals analyses. Samples collected for total metals were placed in 500 milliliter (ml) polyethylene bottles and preserved with nitric acid. Samples collected for dissolved metals were filtered in the field using disposable 0.45-micron filters. The filtered samples were then placed in 500 ml polyethylene bottles and preserved with nitric acid. Samples were also collected for total organic carbon (TOC, EPA Method 415.1), chemical oxygen demand (COD, Hach Method 8000, 40 CFR 136), and total dissolved solids (TDS, EPA Method 160.1) analyses. Temperature, conductivity, pH, and redox potential (Eh) were measured in the field. The above suite of analyses was specified in the Work Plan. Although not required by the Work Plan, samples were also collected for ammonia and total Kjeldahl nitrogen analyses (by EPA Methods 350.2/350.3 and 351.3, respectively).

Quality Assurance/Quality Control samples included two field duplicates (at OW-46 and OW-49), two matrix spike/matrix spike duplicates (at OW-18A and OW-48A), and two equipment rinsate blanks. Samples were maintained under Chain-of-Custody procedures given in the Quality Assurance Project Plan (QAPjP, Golder Associates Inc., 1989) and shipped to Environmental Testing and Certification (ETC) by overnight courier. Copies of the Chain-of-Custody forms are given in Appendix E.

3.0 RESULTS

The locations of the new monitoring wells, as well as pre-existing wells which were installed as part of the Remedial Investigation (Stauffer Chemical Company, 1984), the Pre-Design Investigation (Golder Associates Inc., 1991b), and the Ground-Water/Surface Water Investigation Plan Phase I Remedial Investigation (Roux Associates Inc., 1991), are shown on Figure 1. Borehole and well construction data are given in Table 1, and water-level measurements are given in Table 2.

The CLP-RAS data packages were validated in accordance with USEPA Region I guidelines (USEPA, 1989). The CLP data validation narrative is given in Appendix F. The non-CLP data were assessed in accordance with guidelines given in the QAPjP (Golder Associates Inc., 1989). This assessment is documented in Appendix G. The qualified analytical data are summarized in Tables 3 through 5 for dissolved TAL metals, total TAL metals, and general water quality parameters, respectively.

Overall, the data are considered useable for the purposes of this task. Although much of the data for detected analytes are qualified as estimated (J), they still show the relative concentrations for various monitoring points such that concentration patterns can be discerned.

4.0 DISCUSSION

4.1 Dissolved Arsenic

4.1.1 Monitoring Wells in the Vicinity of the Arsenic Pit

The analytical results for dissolved arsenic in filtered groundwater samples collected in monitoring wells located in the vicinity of the Arsenic Pit are shown on Figure 2. The filtered groundwater sample from OW-43, which is located immediately downgradient of the Arsenic Pit, had a dissolved arsenic concentration of 60.1 ppb, but dissolved arsenic was not detected (<4.2 ppb) in the filtered groundwater sample from OW-44 which is located approximately eighty-five feet downgradient from OW-43. The filtered groundwater sample from OW-45, which is located south of OW-44, had a dissolved arsenic concentration of 999 ppb. The filtered groundwater sample from OW-46, located south of OW-45, contained 64.8 ppb dissolved arsenic.

If the dissolved arsenic detected in the filtered sample from OW-45 was related to the Arsenic Pit, the dissolved arsenic concentrations in filtered samples from OW-43 and OW-44 would be expected to be greater than the 999 ppb concentration detected in OW-45, because OW-43 and OW-44 are located closer to the Arsenic Pit. Therefore, based upon the data shown on Figure 2, it does not appear that the Arsenic Pit is affecting the mobility of dissolved arsenic in the unconsolidated aquifer to any greater extent than the surrounding areas.

4.1.2 Monitoring Wells in the Vicinity of the Chromium Lagoons

The analytical results for dissolved arsenic in filtered groundwater samples collected in the vicinity of the Chromium Lagoons are shown on Figure 2. The filtered groundwater sample from OW-47, which is located approximately 200 feet upgradient of the Chromium Lagoons,

contained 338 ppb dissolved arsenic. The concentration of dissolved arsenic was 657 ppb in the filtered groundwater sample collected from OW-48A, which is located approximately 50 feet downgradient of the Chromium Lagoons. OW-48A is screened in the upper part of the unconsolidated aquifer. The concentration of dissolved arsenic in the filtered groundwater sample from OW-48, which is screened in the lower part of the unconsolidated aquifer, was only 54.2 ppb.

If the Chromium Lagoons were affecting the mobility of dissolved arsenic in the unconsolidated aquifer, the concentration of dissolved arsenic would be expected to be greater in OW-48A than in OW-48 and OW-47. Such a pattern is present in the Site data for dissolved arsenic. Therefore, it appears that the Chromium Lagoons might be influencing the mobility of arsenic in the unconsolidated aquifer. However, it should be noted that the concentration of dissolved arsenic detected in the filtered groundwater sample from OW-48A is not greater than the concentrations of dissolved arsenic detected in filtered groundwater samples from surrounding areas in the unconsolidated aquifer.

4.2 Dissolved Chromium

The analytical results for dissolved chromium in filtered groundwater samples collected from monitoring wells in the vicinity of the Arsenic Pit and Chromium Lagoons are shown on Figure 2. The concentration of dissolved chromium was less than 50 ppb for all 22 filtered groundwater samples collected during this task, and was below the detection limit for 11 of the samples. Therefore, the Arsenic Pit and the Chromium Lagoons do not appear to be affecting the mobility of dissolved chromium in the unconsolidated aquifer to any greater extent than the surrounding areas.

4.3 Other Dissolved Metals

The concentrations of other dissolved TAL metals in the filtered groundwater samples are given in Table 4. Dissolved lead was detected in the filtered sample from OW-22 at a concentration of 286 ppb. Dissolved lead was not detected in previous filtered samples collected from OW-22 on March 21, 1990, and October 17, 1990. The concentration of dissolved lead in filtered groundwater samples from all other monitoring wells was less than 50 ppb. The Chromium Lagoons do not appear to be affecting the mobility of dissolved lead in the unconsolidated aquifer to a greater extent than the surrounding areas because OW-22 is not located downgradient of the Chromium Lagoons. The Arsenic Pit does not appear to be affecting the mobility of dissolved lead in the unconsolidated aquifer to a greater extent than the surrounding areas because the dissolved lead concentration in the filtered groundwater sample from OW-43, which is located closer to the Arsenic Pit than OW-22, is lower than that in OW-22.

Dissolved selenium was detected in the filtered groundwater sample from OW-40 at a concentration of 187 ppb. OW-40 is not downgradient of the Chromium Lagoons. The concentration of dissolved selenium is lower in the filtered groundwater sample from OW-43, which is closer to the Arsenic Pit than OW-40. The concentration of dissolved selenium was less than 10 ppb in all other filtered samples collected in April 1991. Therefore, the Arsenic Pit and the Chromium Lagoons are probably not affecting the mobility of dissolved selenium in the unconsolidated aquifer to any greater extent than the surrounding areas.

Dissolved cadmium was detected in filtered groundwater samples at concentrations greater than 10 ppb at adjacent locations OW-18 (26.0 ppb), OW-18A (17.2 ppb), and OW-50 (18.9 ppb). These three adjacent locations are downgradient of the Chromium Lagoons. However, the concentration of dissolved cadmium in filtered groundwater samples from monitoring wells OW-48A, OW-48, OW-49A, and OW-49, which are closer to the Chromium Lagoons, was less than 4.9 ppb. Therefore, the Arsenic Pit and the Chromium Lagoons do not appear to be affecting the mobility of dissolved cadmium in the unconsolidated aquifer to any greater extent than the surrounding areas.

5.0 SUMMARY

Eleven new monitoring wells were installed downgradient from the Arsenic Pit and the Chromium Lagoons. Groundwater samples were collected from selected monitoring wells and analyzed for total and dissolved TAL metals, as well as several general water quality parameters. A complete round of synoptic water level measurements was recorded.

The Arsenic Pit does not appear to be influencing the mobility of selected trace metals in the unconsolidated aquifer to any greater extent than the surrounding areas. Based upon the concentrations of dissolved arsenic detected in filtered groundwater samples adjacent to the Chromium Lagoons, it appears that the Chromium Lagoons might be influencing the mobility of arsenic in the unconsolidated aquifer. The Chromium Lagoons do not appear to be affecting the mobility of other TAL trace metals in the unconsolidated aquifer to a greater extent than the surrounding areas.

6.0 REFERENCES

Golder Associates Inc., 1989. Quality Assurance Project Plan, Pre-Design Investigation, Industri-Plex Site, Woburn, MA, December.

Golder Associates Inc., 1991a. Work Plan, Supplemental Pre-Design Investigation of the Arsenic Pit and Chromium Lagoons, Industri-Plex Site, Woburn, MA, March.

Golder Associates Inc., 1991b. Pre-Design Investigation Task GW-1, Plume Delineation, Interim Final Report, Industri-Plex Site, Woburn, MA, March.

Roux Associates Inc., 1991. Ground-Water/Surface Water Investigation Plan, Phase 1 Remedial Investigation, Final Report, prepared for Industri-Plex Site Remedial Trust, Woburn, MA.

Stauffer Chemical Company, 1984. Woburn Environmental Studies, Phase 2 Report, Industri-Plex Site, Woburn, MA.

U.S. Environmental Protection Agency, 1989. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, USEPA Region 1, February.

C:AUG91RPT:ARS8-1F

WELL CONSTRUCTION AND BOREHOLE DATA

WELL / BOREHOLE NUMBER	FIELD PROGRAM	COORDINATES NORTHING	COORDINATES EASTING		(FT, MSL) GROUND SURFACE ELEV.	WELL DIAMETER/ WELL MATERIAL	TOTAL DEPTH OF WELL (FT BELOW LAND SURFACE)	(FT, MSL) ELEV. OF PVC/MP	STICKUP (FT ABOVE LAND SURFACE)	SCREENED INTERVAL (FT BELOW LAND SURFACE)			FORMATION
OW-1	RI/FS	554602.90	697441.20	*	79.2	6" steel	108.03	80.32	0.89	24.03	to	108.03	bedrock
OW-1A	RI/FS	554529.40	697382.40	*	79.4	4" PVC	24.32	79.72	0.51	4.32	to	24.32	overburden
OW-2	RI/FS	554837.81	696878.17										
OW-4	RI/FS	553992.00	698514.70	*	70.6	6" steel	42.76	71.54	0.96	22.76	to	42.76	bedrock
OW-6	RI/FS	549367.60	699764.70	*	62.7	4" PVC	16.85	67.70	0.00	6.85	to	16.85	overburden
OW-7	RI/FS	548941.20	698323.50	*	57.2	4" PVC	31.49	57.88	0.65	1.49	to	31.49	overburden
OW-9	RI/FS	552647.10	696250.00	*	67.3	6" steel	127.31	68.88	1.63	32.31	to	127.31	bedrock
OW-10	RI/FS	552699.15	695361.10		63.8	4" PVC	31.42	64.83	0.80	1.42	to	31.42	overburden
OW-11	RI/FS	553639.34	695131.17		70.0	4" PVC	41.11	71.21	1.21	1.11	to	41.11	overburden
OW-12	RI/FS	552234.19	696621.33		62.6	4" PVC	50.67	63.74	1.08	10.67	to	50.67	overburden
OW-13	RI/FS	552578.45	697361.10		65.0	4" PVC	32.15	64.99	0.00	7.15	to	32.15	overburden
OW-14	RI/FS	552647.10	696117.60	*	64.4	4" PVC	47.39	65.54	1.11	2.39	to	47.39	overburden
OW-15	RI/FS	553514.70	698764.70	*	64.1	6" steel	25.82	64.60	0.49	5.82	to	25.82	overburden
OW-16	RI/FS	553529.40	697205.90	*	66.1	4" PVC	66.10	67.29	1.15	15.83	to	35.83	overburden
OW-17	RI/FS	551617.60	696676.50	*	56.8	4" PVC	25.27	57.86	1.05	5.27	to	25.27	overburden
OW-18	RI/FS	551764.70	696367.60	*	62.5	6" PVC	55.15	62.76	0.31	15.15	to	55.15	overburden
OW-18A	RI/FS	551794.10	696426.50	*	61.3	4" PVC	15.20	62.08	0.77	5.20	to	15.20	overburden
OW-19	GSIP	550441.20	697294.10	*	54.4	6" PVC	67.00	55.97	1.54	37.00	to	67.00	overburden
OW-19A	GSIP	550470.60	697279.40	*	54.8	4" PVC	38.60	55.87	1.08	3.60	to	38.60	overburden
OW-20	PDI	548955.90	697676.50	*	57.3	4" PVC	90.72	57.33	0.00	40.72	to	90.72	overburden
OW-21	PDI	554959.32	696057.48		73.7	4" PVC	15.04	76.28	2.53	5.04	to	15.04	overburden

 Reference Notes on Page 3

WELL CONSTRUCTION AND BOREHOLE DATA												
WELL / BOREHOLE NUMBER	FIELD PROGRAM	COORDINATES		(FT, MSL) GROUND SURFACE ELEV.	WELL DIAMETER/ WELL MATERIAL	TOTAL DEPTH OF WELL (FT BELOW LAND SURFACE)	(FT, MSL) ELEV. OF PVC/MP	STICKUP (FT ABOVE LAND SURFACE)	SCREENED INTERVAL (FT BELOW LAND SURFACE)			FORMATION
		NORTHING	EASTING									
OW-22	PDI	553799.67	696447.81	78.6	2" PVC	13.52	81.80	3.12	3.52	to	13.52	overburden
OW-23	PDI	551188.96	698054.01	66.1	4" PVC	27.00	68.54	3.00	16.85	to	27.00	overburden
OW-24A	PDI	550703.40	697558.96	57.9	4" PVC	24.97	57.47	-0.60	14.82	to	24.97	overburden
OW-24B	PDI	550708.99	697556.28	57.9	4" PVC	59.65	57.26	-0.50	49.50	to	59.65	overburden
OW-25A	PDI	549263.22	697250.52	66.2	4" PVC	23.00	66.00	-0.30	12.85	to	23.00	overburden
OW-25B	PDI	549260.96	697238.35	66.2	4" PVC	39.42	65.34	-0.78	29.22	to	39.42	overburden
OW-26A	PDI	550643.58	698890.86	61.4	4" PVC	23.20	64.15	1.90	13.05	to	23.20	overburden
OW-26B	GSIP	550641.94	698883.00	61.4	4" PVC	41.46	63.80	2.30	31.31	to	41.46	overburden
OW-27A	PDI	547732.64	697667.56	69.0	4" PVC	40.32	70.84	2.41	30.17	to	40.32	overburden
OW-27B	PDI	547722.38	697666.92	69.0	4" PVC	94.57	70.52	1.43	84.42	to	94.57	overburden
OW-28	PDI	554288.17	697256.05	74.5	4" PVC	8.92	77.20	2.63	3.92	to	8.92	overburden
OW-29	PDI	548328.34	699375.14	61.6	4" PVC	25.70	61.17	-0.63	15.55	to	25.70	overburden
OW-30A	PDI	550944.81	696591.83	63.0	4" PVC	18.72	65.90	2.00	8.57	to	18.72	overburden
OW-30B	PDI	550941.31	696595.64	63.0	4" PVC	57.83	65.60	2.50	47.68	to	57.83	overburden
OW-31	PDI	554644.98	695795.19	71.3	4" PVC	14.00	74.16	3.05	8.40	to	13.40	overburden
OW-32	PDI	554558.82	696063.00	71.7	4" PVC	8.00	74.96	3.77	5.50	to	7.70	overburden
OW-33A	PDI	549586.50	697754.51	54.5	4" PVC	44.40	56.83	2.40	34.20	to	44.40	overburden
OW-33B	PDI	549580.20	697752.29	54.5	4" PVC	84.01	56.66	2.30	73.86	to	84.01	overburden
OW-36	PDI	554108.71	695680.89	72.7	4" PVC	12.90	74.86	2.16	2.90	to	12.90	overburden
OW-37	PDI	553886.80	695878.22	69.3	4" PVC	15.72	72.60	3.30	5.52	to	15.72	overburden
OW-38	PDI	553514.80	695611.30	69.8	4" PVC	15.50	71.40	1.60	5.30	to	15.50	overburden

WELL CONSTRUCTION AND BOREHOLE DATA

WELL / BOREHOLE NUMBER	FIELD PROGRAM	COORDINATES NORTHING	COORDINATES EASTING	(FT, MSL) GROUND SURFACE ELEV.	WELL DIAMETER/ WELL MATERIAL	TOTAL DEPTH OF WELL (FT BELOW LAND SURFACE)	(FT, MSL) ELEV. OF PVC/MP	STICKUP (FT ABOVE LAND SURFACE)	SCREENED INTERVAL (FT BELOW LAND SURFACE)			FORMATION
OW-39	PDI	553211.56	697034.51	71.8	4" PVC	15.10	74.14	2.34	5.10	to	15.10	overburden
OW-40	PDI	552759.89	696441.38	68.7	4" PVC	17.00	71.64	2.94	6.80	to	17.00	overburden
OW-41	PDI	552685.37	696947.98	67.5	4" PVC	16.00	66.95	-0.55	5.80	to	16.00	overburden
OW-42	PDI	551691.32	697008.81	67.0	4" PVC	34.00	69.80	2.80	23.80	to	34.00	overburden
OW-43	PDI	553983.40	696106.80	74.60	4" PVC	14.00	76.17	1.57	9.00	to	14.00	overburden
OW-44	PDI	553902.30	696123.80	69.30	4" PVC	16.50	70.60	1.30	6.50	to	16.50	overburden
OW-45	PDI	553581.50	696162.50	69.40	4" PVC	17.00	70.84	1.44	7.00	to	17.00	overburden
OW-46	PDI	553059.90	696119.20	68.20	4" PVC	13.50	67.88	-0.32	8.50	to	13.50	overburden
OW-47	PDI	552754.20	696165.30	67.80	4" PVC	16.50	69.23	1.43	11.50	to	16.50	overburden
OW-48	PDI	552337.60	696264.50	63.00	4" PVC	65.75	64.72	1.72	34.50	to	44.50	overburden
OW-48A	PDI	552334.90	696254.20	62.70	4" PVC	24.50	64.39	1.69	14.50	to	24.50	overburden
OW-49	PDI	552204.40	696305.30	64.20	4" PVC	56.00	66.06	1.86	46.00	to	56.00	overburden
OW-49A	PDI	552193.50	696308.40	65.20	4" PVC	26.00	66.42	1.22	16.00	to	26.00	overburden
OW-50	PDI	552001.10	696357.80	66.80	4" PVC	76.00	68.38	1.58	40.00	to	50.00	overburden
OW-50A	PDI	552007.00	696353.30	66.50	4" PVC	28.50	68.00	1.50	18.50	to	28.50	overburden

Note: * Locations are approximate
- Not applicable

WATER LEVEL MEASUREMENTS, INDUSTRIPLEX SITE
4/17/91-4/19/91

WELL NUMBER	M.P. ELEV.	DEPTH TO WATER	W.L. ELEV.	WELL NUMBER	M.P. ELEV.	DEPTH TO WATER	W.L. ELEV.	WELL NUMBER	M.P. ELEV.	DEPTH TO WATER	W.L. ELEV.
OW-1	80.32	7.79	72.53	OW-20	57.33	6.49	50.84	OW-33B	56.66	5.50	51.16
OW-1A	79.72	6.73	72.99	OW-21	76.28	5.44	70.84	OW-36	74.86	5.52	69.34
OW-2	-	10.82	-	OW-22	81.80	9.00	72.80	OW-37	72.60	5.67	66.93
OW-4	71.54	6.76	64.78	OW-23	68.54	14.61	53.93	OW-38	71.40	7.56	63.84
OW-6	67.70	8.51	59.19	OW-24A	57.47	5.09	52.38	OW-39	74.14	9.41	64.73
OW-7	57.88	6.86	51.02	OW-24B	57.26	5.02	52.24	OW-40	71.64	12.09	59.55
OW-9	68.88	28.36	40.52	OW-25A	66.00	14.48	51.52	OW-41	66.95	6.25	60.70
OW-10	64.83	5.51	59.32	OW-25B	65.34	14.03	51.31	OW-42	69.80	17.10	52.70
OW-11	71.21	4.55	66.66	OW-26A	64.15	9.22	54.93	OW-43	76.17	8.61	67.56
OW-12	63.74	7.52	56.22	OW-26B	63.80	8.89	54.91	OW-44	70.60	2.94	67.66
OW-13	64.99	4.74	60.25	OW-27A	70.84	18.57	52.27	OW-45	70.84	4.89	65.95
OW-14	65.54	8.65	56.89	OW-27B	70.52	19.17	51.35	OW-46	67.88	3.68	64.20
OW-15	64.60	4.24	60.36	OW-28	77.20	11.45	65.75	OW-47	69.23	10.55	58.68
OW-16	67.29	2.70	64.59	OW-29	61.17	5.60	55.57	OW-48	64.72	8.09	56.63
OW-17	57.86	6.09	51.77	OW-30A	65.90	12.49	53.41	OW-48A	64.39	7.74	56.65
OW-18	62.76	9.09	53.67	OW-30B	65.60	12.27	53.33	OW-49	66.06	9.82	56.24
OW-18A	62.08	8.41	53.67	OW-31	74.16	4.28	69.88	OW-49A	66.42	10.35	56.07
OW-19	55.97	4.44	51.53	OW-32	74.96	4.80	70.16	OW-50	68.38	13.18	55.20
OW-19A	55.87	4.33	51.54	OW-33A	56.83	5.72	51.11	OW-50A	68.00	12.75	55.25

NOTE: 1)M.P. refers to measuring point.
2)W.L. refers to water level.

TABLE 3

Qualified Data for Dissolved Metals

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

QA/QC Sample: 01EQB

Chemical Parameter		CRDL	04/11/91		
Aluminum, dissolved	mg/l	0.2	0.095	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	<0.0011	UJ	(0.0011)
Barium, dissolved	mg/l	0.2	0.0032	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0002	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	U	(0.001)
Calcium, dissolved	mg/l	5	0.524	A	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.0049	UJ	(0.0049)
Iron, dissolved	mg/l	0.1	0.139	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	0.0911	U	(0.0257)
Manganese, dissolved	mg/l	0.015	0.0059	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	0.0001	J	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	<0.135	UJ	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	0.658	U	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0111	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

QA/QC Sample: 02EQB

Chemical Parameter		CRDL	04/18/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0048	U	(0.0011)
Barium, dissolved	mg/l	0.2	<0.0011	UJ	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	0.0427	UJ	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.0049	U	(0.0049)
Iron, dissolved	mg/l	0.1	0.0105	UJ	(0.0068)
Lead, dissolved	mg/l	0.003	0.0027	U	(0.002)
Magnesium, dissolved	mg/l	5	<0.0257	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.0017	UJ	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	0.278	U	(0.135)
Selenium, dissolved	mg/l	0.005	0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	<0.07	UJ	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	<0.0034	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-9

Chemical Parameter		CRDL	03/19/90			08/17/90			10/18/90			04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0535	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0028	A	(0.0020)	0.0046	J	(0.0020)	0.0078	A	(0.0030)	<0.0127	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0191	J	(0.0020)	0.0089	A	(0.0010)	0.0078	A	(0.0006)	<0.0078	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		0.0004	U	(0.0003)	0.0006	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.005	U	(0.0050)		-		<0.0017	UJ	(0.0017)	<0.001	U	(0.001)
Calcium, dissolved	mg/l	5	141	J	(0.0200)		-		195.0000	A	(0.0327)	207	A	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		0.4550	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.007	U	(0.0070)		-		0.0095	U	(0.0017)	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.006	U	(0.0060)		-		0.0316	U	(0.0045)	0.0058	J	(0.0049)
Iron, dissolved	mg/l	0.1	0.032	J	(0.0030)		-		1.7100	A	(0.0114)	0.0186	UJ	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		0.0010	UJ	(0.0010)	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	15.1	J	(0.0370)		-		15.7000	A	(0.0301)	13.7	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.115	A	(0.0010)		-		0.1670	A	(0.0005)	0.17	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.012	U	(0.0120)		-		0.3470	A	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	2.87	A	(0.9000)		-		1.2000	J	(0.9700)	2.79	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.002	U	(0.0020)		-		0.0030	U	(0.0030)	0.016	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	232	J	(0.0380)		-		22.3000	A	(0.0116)	18.8	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		0.0020	U	(0.0020)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.006	U	(0.0060)		-		0.0029	A	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0421	R	(0.0080)	<0.006	U	(0.0060)	0.0188	U	(0.0019)	<0.0034	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-12

Chemical Parameter		CRDL	03/15/90			08/15/90			10/15/90			04/18/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0508	J	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.422	A	(0.0020)	0.0364	J	(0.002)	0.5560	A	(0.0030)	0.572	A	(0.0265)
Barium, dissolved	mg/l	0.2	0.101	J	(0.0020)	0.04	A	(0.001)	0.0944	A	(0.0006)	0.229	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		<0.0003	U	(0.0003)	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.005	U	(0.0050)		-		0.0034	U	(0.0017)	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	491	J	(0.0200)		-		344.0000	A	(0.0327)	42.1	J	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0355	A	(0.0030)		-		0.0498	J	(0.0017)	0.0109	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.007	U	(0.0070)		-		0.0041	U	(0.0017)	0.0112	A	(0.0041)
Copper, dissolved	mg/l	0.025	<0.006	U	(0.0060)		-		0.0590	U	(0.0045)	0.0067	U	(0.0049)
Iron, dissolved	mg/l	0.1	5.13	J	(0.0030)		-		0.1200	U	(0.0114)	47.6	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		<0.0010	UJ	(0.0010)	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	108	J	(0.0370)		-		130.0000	A	(0.0301)	31.1	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.4	A	(0.0010)		-		0.2240	A	(0.0005)	1.31	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.012	U	(0.0120)		-		<0.0107	UJ	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	9.18	A	(0.9000)		-		10.4000	J	(0.9700)	15.2	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.002	U	(0.0020)		-		<0.0030	UJ	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	150	J	(0.0380)		-		220.0000	A	(0.0116)	31.6	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		<0.0020	U	(0.0020)	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0224	A	(0.0060)		-		0.0424	A	(0.0020)	0.0057	A	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0463	R	(0.0080)	0.009	J	(0.006)	0.0323	U	(0.0019)	0.0098	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-14

Chemical Parameter		CRDL	03/15/90			08/16/90			04/12/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0075	A	(0.0020)	0.0041	J	(0.0020)	0.0351	J	(0.0011)
Barium, dissolved	mg/l	0.2	0.0280	J	(0.0020)	0.0311	A	(0.0010)	0.0364	A	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		0.0004	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0055	A	(0.0050)		-		0.0033	A	(0.001)
Calcium, dissolved	mg/l	5	87.9000	J	(0.0200)		-		125	A	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		0.0044	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0103	A	(0.0070)		-		0.0116	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0176	A	(0.0060)		-		0.0156	J	(0.0049)
Iron, dissolved	mg/l	0.1	0.6280	J	(0.0030)		-		3.6	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0163	A	(0.0020)		-		0.0063	U	(0.002)
Magnesium, dissolved	mg/l	5	5.1700	J	(0.0370)		-		5.59	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.0474	A	(0.0010)		-		0.292	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.012	U	(0.0120)		-		0.0139	A	(0.0099)
Potassium, dissolved	mg/l	5	3.1100	A	(0.9000)		-		4.57	J	(0.135)
Selenium, dissolved	mg/l	0.005	0.0352	A	(0.0020)		-		0.008	J	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	12.7000	J	(0.0380)		-		14.4	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		0.0023	A	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.006	U	(0.0060)		-		<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	2.1100	R	(0.0080)	1.61	J	(0.0060)	0.898	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-17

Chemical Parameter		CRDL	03/15/90			08/14/90			10/16/90			04/11/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	0.121	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0305	A	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.1640	A	(0.0020)	0.083	J	0.002	0.1640	A	(0.0030)	0.0371	J	(0.0011)
Barium, dissolved	mg/l	0.2	0.0519	J	(0.0020)	0.023	A	0.001	0.0317	A	(0.0006)	0.017	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		<0.0003	U	(0.0003)	0.0024	J	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.005	U	(0.0050)		-		0.0033	A	(0.0017)	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	236.0000	J	(0.0200)		-		108.0000	A	(0.0327)	485	A	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0265	A	(0.0030)		-		0.0213	J	(0.0017)	0.0383	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.007	U	(0.0070)		-		0.0044	U	(0.0017)	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.006	U	(0.0060)		-		0.1880	U	(0.0045)	0.0113	U	(0.0049)
Iron, dissolved	mg/l	0.1	0.8310	J	(0.0030)		-		0.1490	U	(0.0114)	61.1	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		<0.0010	UJ	(0.0010)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	70.8000	J	(0.0370)		-		68.3000	A	(0.0301)	85.7	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.4360	A	(0.0010)		-		0.1860	A	(0.0005)	1.82	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.1000	U	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.012	U	(0.0120)		-		0.0173	A	(0.0107)	0.0109	A	(0.0099)
Potassium, dissolved	mg/l	5	261.0000	A	(0.9000)		-		11.5000	A	(0.9700)	47.1	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.002	U	(0.0020)		-		<0.0030	U	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	663.0000	J	(0.0380)		-		197.0000	A	(0.0116)	1480	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		<0.0020	UJ	(0.0020)	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0134	A	(0.0060)		-		0.1260	A	(0.0020)	0.0187	J	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0785	R	(0.0080)	0.0632	J	0.006	0.0370	U	(0.0019)	0.0149	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-18

Chemical Parameter		CRDL	03/15/90			08/15/90			10/16/90			04/17/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0231	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	<0.002	U	(0.0020)	0.0031	J	(0.002)	<0.003	U	(0.0030)	0.0024	U	(0.0011)
Barium, dissolved	mg/l	0.2	0.1960	J	(0.0020)	0.0179	A	(0.001)	0.0174	A	(0.0006)	0.0035	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		<0.0003	U	(0.0003)	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0252	A	(0.0050)		-		0.0267	A	(0.0017)	0.028	J	(0.001)
Calcium, dissolved	mg/l	5	83.3000	J	(0.0200)		-		78.8000	A	(0.0327)	107	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		0.0201	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0168	A	(0.0070)		-		0.0131	A	(0.0017)	0.0173	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.1220	A	(0.0060)		-		0.1370	U	(0.0045)	0.178	A	(0.0049)
Iron, dissolved	mg/l	0.1	0.5770	J	(0.0030)		-		0.9600	A	(0.0114)	1.59	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		<0.0010	UJ	(0.0010)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	8.5800	J	(0.0370)		-		7.4900	A	(0.0301)	9.97	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.7360	A	(0.0010)		-		0.5260	A	(0.0005)	0.892	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.1000	U	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0133	A	(0.0120)		-		0.0166	A	(0.0107)	0.012	A	(0.0099)
Potassium, dissolved	mg/l	5	6.0700	A	(0.9000)		-		3.1900	J	(0.9700)	6.28	A	(0.135)
Selenium, dissolved	mg/l	0.005	0.0020	A	(0.0020)		-		<0.0030	U	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	63.1000	J	(0.0380)		-		75.5000	A	(0.0116)	50.4	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		0.0027	J	(0.0020)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.006	U	(0.0060)		-		<0.0020	U	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	8.0000	R	(0.0080)	8.99	J	(0.006)	7.3000	A	(0.0018)	9.1	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-18A

Chemical Parameter		CRDL	03/15/90			08/14/90			10/16/90			04/17/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0310	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	<0.002	U	(0.0020)	<0.002	U	(0.002)	<0.0030	U	(0.0030)	0.0041	U	(0.0011)
Barium, dissolved	mg/l	0.2	0.0460	J	(0.0020)	0.0245	A	(0.001)	0.0246	A	(0.0006)	0.0023	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		<0.0003	U	(0.0003)	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0205	A	(0.0050)		-		0.0073	U	(0.0017)	0.0172	J	(0.001)
Calcium, dissolved	mg/l	5	122.0000	J	(0.0200)		-		80.9000	A	(0.0327)	127	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		0.0148	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0191	A	(0.0070)		-		0.0069	U	(0.0017)	0.0118	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0351	A	(0.0060)		-		0.0268	U	(0.0045)	0.0567	A	(0.0049)
Iron, dissolved	mg/l	0.1	0.0427	J	(0.0030)		-		0.1850	U	(0.0114)	0.525	U	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		<0.0010	UJ	(0.0010)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	9.4900	J	(0.0370)		-		4.8300	A	(0.0301)	8.32	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.6710	A	(0.0010)		-		0.1510	A	(0.0005)	0.458	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.1000	U	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0182	A	(0.0120)		-		0.0114	A	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	5.6600	A	(0.9000)		-		2.5600	J	(0.9700)	4.75	A	(0.135)
Selenium, dissolved	mg/l	0.005	0.0056	A	(0.0020)		-		0.0058	J	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	42.2000	J	(0.0380)		-		28.3000	A	(0.0116)	21.4	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		<0.0020	U	(0.0020)	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.006	U	(0.0060)		-		<0.0020	U	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	7.2200	R	(0.0080)	4.13	J	(0.006)	2.1500	A	(0.0019)	6.29	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U *Chemical Parameter Not Detected*
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-22

Chemical Parameter		CRDL	03/21/90			08/17/90			10/17/90			04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.027	U	(0.0270)		-		<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.037	U	(0.0370)		-		0.0618	A	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0044	A	(0.0020)	<0.002	U	(0.002)	<0.0030	U	(0.0030)	0.0018	U	(0.0011)
Barium, dissolved	mg/l	0.2	0.1960	J	(0.0020)	0.0722	A	(0.001)	0.0886	A	(0.0006)	0.0747	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.001	U	(0.0010)		-		<0.0003	U	(0.0003)	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.005	U	(0.0050)		-		<0.0017	U	(0.0017)	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	198.0000	J	(0.0200)		-		305.0000	A	(0.0327)	384	J	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0042	A	(0.0030)		-		0.0186	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.007	U	(0.0070)		-		0.0190	A	(0.0017)	0.0082	A	(0.0041)
Copper, dissolved	mg/l	0.025	<0.006	U	(0.0060)		-		0.0357	U	(0.0045)	0.0494	J	(0.0049)
Iron, dissolved	mg/l	0.1	6.3200	J	(0.0030)		-		0.3360	A	(0.0114)	0.093	U	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.0020)		-		0.0020	UJ	(0.0010)	0.286	A	(0.002)
Magnesium, dissolved	mg/l	5	52.1000	J	(0.0370)		-		62.5000	A	(0.0301)	45.5	J	(0.0257)
Manganese, dissolved	mg/l	0.015	3.0200	A	(0.0010)		-		2.5400	A	(0.0005)	2.16	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.2	U	(0.2000)		-		<0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.012	U	(0.0120)		-		0.0420	A	(0.0107)	0.0128	A	(0.0099)
Potassium, dissolved	mg/l	5	10.5000	A	(0.9000)		-		15.2000	A	(0.9700)	11.5	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.002	U	(0.0020)		-		<0.0030	U	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.003	U	(0.0030)		-		<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	26.4000	J	(0.0380)		-		22.0000	A	(0.0116)	13	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.004	U	(0.0040)		-		<0.0020	U	(0.0020)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.006	U	(0.0060)		-		<0.0020	U	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0457	R	(0.0080)	0.025	J	(0.006)	0.0611	U	(0.0019)	0.116	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-37

Chemical Parameter		CRDL	10/18/90			04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	0.0187	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.3430	A	(0.0030)	0.172	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0245	A	(0.0006)	0.0278	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.0003	U	(0.0003)	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.0017	UJ	(0.0017)	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	49.7000	A	(0.0327)	62	J	(0.0183)
Chromium, dissolved	mg/l	0.01	0.4490	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0091	U	(0.0017)	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	0.0927	U	(0.0045)	0.0056	A	(0.0049)
Iron, dissolved	mg/l	0.1	2.1000	A	(0.0114)	1.43	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.0010	UJ	(0.0010)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	6.3100	A	(0.0301)	7.21	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.5380	A	(0.0005)	0.257	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.3200	A	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	2.8000	J	(0.9700)	4.58	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0030	U	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	29.3000	A	(0.0116)	21.3	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0020	U	(0.0020)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0030	A	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0267	U	(0.0019)	0.0074	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-38

Chemical Parameter		CRDL	10/17/90			10/17/90 Replicate			04/12/91		
Aluminum, dissolved	mg/l	0.2	<0.0385	U	(0.0385)	<0.0385	U	(0.0385)	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	0.0459	A	(0.0096)	0.0509	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.12	A	(0.003)	0.132	A	(0.003)	0.022	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0117	A	(0.0006)	0.012	A	(0.0006)	0.0124	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.0003	U	(0.0003)	<0.0003	U	(0.0003)	0.0004	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.0017	U	(0.0017)	0.0018	A	(0.0017)	<0.001	U	(0.001)
Calcium, dissolved	mg/l	5.0	126.7	A	(0.0327)	133.0	A	(0.0327)	167	A	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0156	J	(0.0017)	0.042	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0269	A	(0.0017)	0.0291	A	(0.0017)	0.0522	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0416	U	(0.0045)	0.0732	U	(0.0045)	0.0062	J	(0.0049)
Iron, dissolved	mg/l	0.1	0.632	A	(0.0114)	0.724	A	(0.0114)	12	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.001	UJ	(0.001)	<0.001	UJ	(0.001)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5.0	5.01	A	(0.0301)	5.21	A	(0.0301)	4.49	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.41	A	(0.0005)	0.43	A	(0.0005)	0.361	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.1	UJ	(0.1)	<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0717	A	(0.0107)	0.0863	A	(0.0107)	0.137	A	(0.0099)
Potassium, dissolved	mg/l	5.0	6.9	A	(0.97)	7.67	A	(0.97)	5.45	J	(0.135)
Selenium, dissolved	mg/l	0.005	0.003	J	(0.003)	0.0053	J	(0.003)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0084	U	(0.0084)	<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5.0	28.1	A	(0.0116)	28.7	A	(0.0116)	19.1	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.002	U	(0.002)	0.0042	A	(0.002)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0098	A	(0.002)	0.0101	A	(0.002)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.275	A	(0.0019)	0.291	A	(0.0019)	0.475	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-40

Chemical Parameter		CRDL	10/15/90			04/12/91		
Aluminum, dissolved	mg/l	0.2	<0.0385	U	(0.0385)	0.545	A	(0.0215)
Antimony, dissolved	mg/l	0.06	0.1220	J	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	<0.0030	U	(0.0030)	0.0036	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0319	A	(0.0006)	0.0323	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.0003	U	(0.0003)	0.0008	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.0017	U	(0.0017)	0.0027	J	(0.001)
Calcium, dissolved	mg/l	5	662.0000	A	(0.0327)	646	A	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0027	J	(0.0017)	0.0048	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0259	A	(0.0017)	0.0464	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.1240	U	(0.0045)	0.087	J	(0.0049)
Iron, dissolved	mg/l	0.1	0.0375	U	(0.0114)	0.0564	UJ	(0.0068)
Lead, dissolved	mg/l	0.003	<0.0010	UJ	(0.0010)	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	7.5300	A	(0.0301)	10.5	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.0758	A	(0.0005)	0.0811	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0107	UJ	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	3.7300	J	(0.9700)	4.45	J	(0.135)
Selenium, dissolved	mg/l	0.005	0.0634	A	(0.0030)	0.187	J	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	11.8000	A	(0.0116)	5.6	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0020	UJ	(0.0020)	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0020	U	(0.0020)	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.1320	A	(0.0019)	0.496	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-42

Chemical Parameter		CRDL	10/15/90			04/18/91		
Aluminum, dissolved	mg/l	0.2	<0.0385	U	(0.0385)	0.0278	A	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0096	UJ	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.5000	A	(0.0030)	0.143	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.1930	A	(0.0006)	0.0396	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.0003	U	(0.0003)	0.0003	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0030	U	(0.0017)	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	45.4000	A	(0.0327)	534	J	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0042	J	(0.0017)	0.0329	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0263	A	(0.0017)	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	0.0063	U	(0.0045)	0.0186	U	(0.0049)
Iron, dissolved	mg/l	0.1	24.5000	A	(0.0114)	7.94	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.0010	UJ	(0.0010)	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	31.0000	A	(0.0301)	95.7	UJ	(0.0257)
Manganese, dissolved	mg/l	0.015	1.7300	A	(0.0005)	0.474	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.1000	UJ	(0.1000)	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0107	UJ	(0.0107)	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	13.8000	J	(0.9700)	8.35	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0030	UJ	(0.0030)	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0084	U	(0.0084)	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	38.3000	A	(0.0116)	119	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0020	UJ	(0.0020)	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0045	A	(0.0020)	0.0216	J	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0185	U	(0.0019)	0.0179	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-43

Chemical Parameter		CRDL	04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0601	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0257	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	365	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.017	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0188	U	(0.0049)
Iron, dissolved	mg/l	0.1	5.89	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	27.9	J	(0.0257)
Manganese, dissolved	mg/l	0.015	3.57	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0126	A	(0.0099)
Potassium, dissolved	mg/l	5	16.1	A	(0.135)
Selenium, dissolved	mg/l	0.005	0.009	J	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	72.1	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.137	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-44

Chemical Parameter		CRDL	04/17/91		
Aluminum, dissolved	mg/l	0.2	5.73	A	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0043	U	(0.0011)
Barium, dissolved	mg/l	0.2	0.0232	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0006	J	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0047	J	(0.001)
Calcium, dissolved	mg/l	5	102	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0435	A	(0.0041)
Copper, dissolved	mg/l	0.025	3.98	A	(0.0049)
Iron, dissolved	mg/l	0.1	18.6	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0445	A	(0.002)
Magnesium, dissolved	mg/l	5	8.87	J	(0.0257)
Manganese, dissolved	mg/l	0.015	2.8	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0527	A	(0.0099)
Potassium, dissolved	mg/l	5	8.24	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	49.5	J	(0.07)
Thallium, dissolved	mg/l	0.01	0.0028	J	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.67	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-45

Chemical Parameter		CRDL	04/17/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	0.0878	A	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.999	A	(0.0265)
Barium, dissolved	mg/l	0.2	0.0148	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	102	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	0.0087	A	(0.0049)
Iron, dissolved	mg/l	0.1	0.746	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	37.9	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.332	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	17.1	A	(0.135)
Selenium, dissolved	mg/l	0.005	0.0098	J	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	29.2	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0119	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-46

Chemical Parameter		CRDL	04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0648	J	(0.0011)
Barium, dissolved	mg/l	0.2	0.012	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0004	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	U	(0.001)
Calcium, dissolved	mg/l	5	78.4	A	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0051	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.0049	UJ	(0.0049)
Iron, dissolved	mg/l	0.1	8.58	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	7.52	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.822	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	16.6	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	98.1	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.0145	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-46DUP

Chemical Parameter		CRDL	04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0581	J	(0.0011)
Barium, dissolved	mg/l	0.2	0.0126	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0002	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	U	(0.001)
Calcium, dissolved	mg/l	5	90.9	A	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.0049	UJ	(0.0049)
Iron, dissolved	mg/l	0.1	7.81	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	UJ	(0.002)
Magnesium, dissolved	mg/l	5	9.18	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.91	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	18.7	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	112	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.015	U	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-47

Chemical Parameter		CRDL	04/16/91		
Aluminum, dissolved	mg/l	0.2	0.174	A	(0.0215)
Antimony, dissolved	mg/l	0.06	0.0236	J	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.338	A	(0.0265)
Barium, dissolved	mg/l	0.2	0.0231	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	608	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0068	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0158	U	(0.0049)
Iron, dissolved	mg/l	0.1	14.9	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0336	A	(0.002)
Magnesium, dissolved	mg/l	5	9.08	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.653	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	15.6	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	75.3	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.512	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-48

Chemical Parameter		CRDL	04/12/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0542	J	(0.0011)
Barium, dissolved	mg/l	0.2	0.0125	U	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0004	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0049	A	(0.001)
Calcium, dissolved	mg/l	5	123	A	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0055	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0111	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0465	J	(0.0049)
Iron, dissolved	mg/l	0.1	4.83	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	7.95	A	(0.0257)
Manganese, dissolved	mg/l	0.015	0.548	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	0.0005	U	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0113	A	(0.0099)
Potassium, dissolved	mg/l	5	6.19	J	(0.135)
Selenium, dissolved	mg/l	0.005	0.016	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	92.4	A	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	3.92	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-48A

Chemical Parameter		CRDL	04/12/91		
Aluminum, dissolved	mg/l	0.2	0.111	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.657	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0415	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0009	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	134	A	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.343	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0094	U	(0.0049)
Iron, dissolved	mg/l	0.1	220	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0024	U	(0.002)
Magnesium, dissolved	mg/l	5	14.5	A	(0.0257)
Manganese, dissolved	mg/l	0.015	2.06	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0258	A	(0.0099)
Potassium, dissolved	mg/l	5	8.84	J	(0.135)
Selenium, dissolved	mg/l	0.005	0.0064	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	98.5	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	0.0187	J	(0.0047)
Zinc, dissolved	mg/l	0.02	9.77	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-49

Chemical Parameter		CRDL	04/17/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0358	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.002	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	51.7	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	0.0076	A	(0.0049)
Iron, dissolved	mg/l	0.1	3.66	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	3.41	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.317	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	3.4	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	40.2	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.121	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-49A

Chemical Parameter		CRDL	04/18/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0613	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0075	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	62.3	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0074	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0081	U	(0.0049)
Iron, dissolved	mg/l	0.1	2.58	J	(0.0068)
Lead, dissolved	mg/l	0.003	<0.002	U	(0.002)
Magnesium, dissolved	mg/l	5	5.54	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.531	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	7.28	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	42.9	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	3.4	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-49DUP

Chemical Parameter		CRDL	04/17/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0377	A	(0.0011)
Barium, dissolved	mg/l	0.2	<0.0011	UJ	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, dissolved	mg/l	5	51.2	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	<0.0041	U	(0.0041)
Copper, dissolved	mg/l	0.025	<0.0049	U	(0.0049)
Iron, dissolved	mg/l	0.1	3.67	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0027	U	(0.002)
Magnesium, dissolved	mg/l	5	3.43	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.318	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	3.25	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	41.3	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	0.118	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-50

Chemical Parameter		CRDL	04/18/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.126	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0683	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	0.0002	U	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0189	J	(0.001)
Calcium, dissolved	mg/l	5	249	J	(0.0183)
Chromium, dissolved	mg/l	0.01	0.0115	A	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0233	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.0217	U	(0.0049)
Iron, dissolved	mg/l	0.1	43.6	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.0052	U	(0.002)
Magnesium, dissolved	mg/l	5	19.3	J	(0.0257)
Manganese, dissolved	mg/l	0.015	1.5	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	0.0275	A	(0.0099)
Potassium, dissolved	mg/l	5	12.5	J	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	202	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	11.9	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 3

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Dissolved Metals

Monitoring Well: OW-50A

Chemical Parameter		CRDL	04/16/91		
Aluminum, dissolved	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, dissolved	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, dissolved	mg/l	0.01	0.0108	A	(0.0011)
Barium, dissolved	mg/l	0.2	0.0235	J	(0.0011)
Beryllium, dissolved	mg/l	0.005	<0.00019	UJ	(0.00019)
Cadmium, dissolved	mg/l	0.005	0.0211	UJ	(0.001)
Calcium, dissolved	mg/l	5	110	J	(0.0183)
Chromium, dissolved	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, dissolved	mg/l	0.05	0.0095	A	(0.0041)
Copper, dissolved	mg/l	0.025	0.118	A	(0.0049)
Iron, dissolved	mg/l	0.1	1.27	J	(0.0068)
Lead, dissolved	mg/l	0.003	0.004	U	(0.002)
Magnesium, dissolved	mg/l	5	7.54	J	(0.0257)
Manganese, dissolved	mg/l	0.015	0.575	J	(0.0012)
Mercury, dissolved	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, dissolved	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, dissolved	mg/l	5	4.79	A	(0.135)
Selenium, dissolved	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, dissolved	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, dissolved	mg/l	5	40.6	J	(0.07)
Thallium, dissolved	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, dissolved	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, dissolved	mg/l	0.02	7.72	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed

Validation Codes

A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

TABLE 4

Qualified Data for Total Metals

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

QA/QC Sample: 01EQB

Chemical Parameter		CRDL	04/11/91		
Aluminum, total	mg/l	0.2	0.0335	U	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	<0.0011	U	(0.0011)
Barium, total	mg/l	0.2	0.0024	U	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	U	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	U	(0.001)
Calcium, total	mg/l	5	0.235	U	(0.0183)
Chromium, total	mg/l	0.01	0.0018	U	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	UJ	(0.0041)
Copper, total	mg/l	0.025	<0.0049	UJ	(0.0049)
Iron, total	mg/l	0.1	0.0571	A	(0.0068)
Lead, total	mg/l	0.005	<0.002	UJ	(0.002)
Magnesium, total	mg/l	5	<0.0658	U	(0.0257)
Manganese, total	mg/l	0.015	<0.0012	UJ	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	<0.135	UJ	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	0.659	U	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.0067	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U *Chemical Parameter Not Detected*
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

QA/QC Sample: 02EQB

Chemical Parameter		CRDL	04/18/91		
Aluminum, total	mg/l	0.2	0.0243	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0024	U	(0.0011)
Barium, total	mg/l	0.2	<0.0011	UJ	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	0.0739	J	(0.0183)
Chromium, total	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	<0.0049	U	(0.0049)
Iron, total	mg/l	0.1	<0.0068	UJ	(0.0068)
Lead, total	mg/l	0.005	<0.002	UJ	(0.002)
Magnesium, total	mg/l	5	<0.0257	UJ	(0.0257)
Manganese, total	mg/l	0.015	<0.0012	UJ	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	<0.135	U	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	<0.07	UJ	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	<0.0034	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-9

Chemical Parameter		CRDL	03/19/90			06/17/90			10/18/90			04/16/91		
Aluminum, total	mg/l	0.2	0.686	A	(0.027)		-		0.0988	J	(0.0385)	<0.0215	U	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.05	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.103	A	(0.002)	0.0220	A	(0.002)	0.0367	A	(0.003)	0.0335	A	(0.0011)
Barium, total	mg/l	0.2	0.0132	A	(0.002)	0.0087	A	(0.001)	0.0064	U	(0.0006)	0.0085	U	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)		-		<0.0003	U	(0.0003)	0.0006	U	(0.0002)
Cadmium, total	mg/l	0.005	<0.005	U	(0.005)		-		<0.0017	U	(0.0017)	<0.001	U	(0.001)
Calcium, total	mg/l	5	139.0	A	(0.02)		-		197.0	A	(0.0327)	207.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.0034	A	(0.003)		-		0.428	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	<0.007	U	(0.007)		-		0.009	U	(0.0017)	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.0153	A	(0.006)		-		0.0275	U	(0.0045)	0.0078	J	(0.0049)
Iron, total	mg/l	0.1	86.3	A	(0.003)		-		5.97	J	(0.0114)	2.08	J	(0.0068)
Lead, total	mg/l	0.005	0.0035	A	(0.002)		-		<0.001	UJ	(0.001)	0.0024	J	(0.002)
Magnesium, total	mg/l	5	14.8	A	(0.037)		-		16.2	A	(0.0301)	13.5	A	(0.0257)
Manganese, total	mg/l	0.015	0.389	A	(0.001)		-		0.222	J	(0.0005)	0.181	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.012	U	(0.012)		-		0.322	J	(0.0107)	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	3.33	A	(0.9)		-		<0.97	UJ	(0.97)	2.86	J	(0.135)
Selenium, total	mg/l	0.005	<0.002	U	(0.002)		-		0.03	J	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	17.5	A	(0.038)		-		20.0	A	(0.0116)	18.2	A	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		<0.002	U	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.006	U	(0.006)		-		0.0043	A	(0.002)	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.0331	R	(0.008)	0.0185	J	(0.006)	0.0068	U	(0.0019)	0.0145	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-12

Chemical Parameter		CRDL	03/15/90			08/15/90			10/15/90			04/18/91		
Aluminum, total	mg/l	0.2	<0.027	U	(0.027)		-		0.0516	J	(0.0385)	1.04	J	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.0547	J	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.344	A	(0.002)	0.0605	A	(0.002)	0.507	A	(0.003)	0.822	A	(0.0265)
Barium, total	mg/l	0.2	0.0676	A	(0.002)	0.0415	A	(0.001)	0.105	A	(0.0006)	0.299	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)		-		<0.0003	U	(0.0003)	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.005	U	(0.005)		-		0.0023	U	(0.0017)	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	517.0	A	(0.02)		-		363.0	A	(0.0327)	44.1	J	(0.0183)
Chromium, total	mg/l	0.01	0.0389	A	(0.003)		-		0.0522	J	(0.0017)	0.0153	A	(0.0043)
Cobalt, total	mg/l	0.05	<0.007	U	(0.007)		-		0.0033	U	(0.0017)	0.0136	J	(0.0041)
Copper, total	mg/l	0.025	<0.006	U	(0.006)		-		0.026	U	(0.0045)	0.0099	U	(0.0049)
Iron, total	mg/l	0.1	13.9	A	(0.003)		-		4.47	J	(0.0114)	52.6	J	(0.0068)
Lead, total	mg/l	0.005	<0.002	U	(0.002)		-		<0.001	UJ	(0.001)	<0.002	UJ	(0.002)
Magnesium, total	mg/l	5	107.0	A	(0.037)		-		128.0	A	(0.0301)	33.1	J	(0.0257)
Manganese, total	mg/l	0.015	0.469	A	(0.001)		-		0.259	J	(0.0005)	1.36	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.012	U	(0.012)		-		0.0182	J	(0.0107)	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	8.66	A	(0.9)		-		10.9	J	(0.97)	15.8	A	(0.135)
Selenium, total	mg/l	0.005	<0.002	U	(0.002)		-		<0.003	UJ	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	130.0	A	(0.038)		-		215.0	A	(0.0116)	33.4	J	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		<0.002	U	(0.002)	<0.0019	UJ	(0.0019)
Vanadium, total	mg/l	0.05	0.0168	A	(0.006)		-		0.0433	A	(0.002)	0.0082	A	(0.0047)
Zinc, total	mg/l	0.02	0.0317	R	(0.008)	0.0204	A	(0.006)	<0.0199	U	(0.0019)	0.0155	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-14

Chemical Parameter		CRDL	03/15/90			08/16/90			04/12/91		
Aluminum, total	mg/l	0.2	0.242	A	(0.027)	-			<0.0215	U	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)	-			<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.124	A	(0.002)	0.0154	A	(0.002)	0.0393	A	(0.0011)
Barium, total	mg/l	0.2	0.0194	A	(0.002)	0.0291	A	(0.001)	0.0376	A	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)	-			<0.0002	U	(0.0002)
Cadmium, total	mg/l	0.005	<0.005	U	(0.005)	-			0.0018	A	(0.001)
Calcium, total	mg/l	5	81.3	A	(0.02)	-			113.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.0063	A	(0.003)	-			<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	0.0085	A	(0.007)	-			0.0116	J	(0.0041)
Copper, total	mg/l	0.025	0.0807	A	(0.006)	-			0.0204	J	(0.0049)
Iron, total	mg/l	0.1	21.6	A	(0.003)	-			4.66	J	(0.0068)
Lead, total	mg/l	0.005	0.299	A	(0.002)	-			0.0397	J	(0.002)
Magnesium, total	mg/l	5	4.75	A	(0.037)	-			5.86	A	(0.0257)
Manganese, total	mg/l	0.015	0.0437	A	(0.001)	-			0.313	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)	-			<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.012	U	(0.012)	-			<0.0099	U	(0.0099)
Potassium, total	mg/l	5	3.47	A	(0.9)	-			4.68	J	(0.135)
Selenium, total	mg/l	0.005	0.0505	A	(0.002)	-			0.0093	J	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)	-			<0.0058	U	(0.0058)
Sodium, total	mg/l	5	11.8	A	(0.038)	-			16.1	A	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)	-			0.002	A	(0.0019)
Vanadium, total	mg/l	0.05	<0.006	U	(0.006)	-			<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	1.91	J	(0.008)	1.51	A	(0.006)	0.913	A	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-17

Chemical Parameter		CRDL	03/15/90			08/14/90			10/16/90			04/11/91		
Aluminum, total	mg/l	0.2	0.122	A	(0.027)		-		0.284	U	(0.0385)	0.86	J	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.0215	A	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.146	A	(0.002)	0.184	A	(0.0020)	0.209	A	(0.003)	0.0507	J	(0.0011)
Barium, total	mg/l	0.2	0.0513	A	(0.002)	0.0505	A	(0.0010)	0.0407	A	(0.0006)	0.0245	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)		-		<0.0003	U	(0.0003)	0.0032	J	(0.0002)
Cadmium, total	mg/l	0.005	<0.005	U	(0.005)		-		0.0047	A	(0.0017)	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	251.0	A	(0.02)		-		100.0	A	(0.0327)	532.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.0381	A	(0.003)		-		0.0251	J	(0.0017)	0.0504	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0109	A	(0.007)		-		0.0265	A	(0.0017)	0.0083	J	(0.0041)
Copper, total	mg/l	0.025	0.0071	A	(0.006)		-		0.202	U	(0.0045)	0.0183	U	(0.0049)
Iron, total	mg/l	0.1	16.0	A	(0.003)		-		8.58	J	(0.0114)	104.0	J	(0.0068)
Lead, total	mg/l	0.005	<0.002	U	(0.002)		-		0.004	U	(0.001)	0.0034	J	(0.002)
Magnesium, total	mg/l	5	75.9	A	(0.037)		-		61.3	A	(0.0301)	116.0	A	(0.0257)
Manganese, total	mg/l	0.015	0.485	A	(0.001)		-		0.214	J	(0.0005)	2.33	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		0.1	U	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	0.0247	A	(0.012)		-		0.0222	J	(0.0107)	0.0158	A	(0.0099)
Potassium, total	mg/l	5	31.3	A	(0.9)		-		8.4	U	(0.97)	56.8	J	(0.135)
Selenium, total	mg/l	0.005	<0.002	U	(0.002)		-		<0.003	UJ	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	757.0	A	(0.038)		-		153.0	A	(0.0116)	1770.0	A	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		<0.002	UJ	(0.002)	<0.0019	UJ	(0.0019)
Vanadium, total	mg/l	0.05	0.0259	A	(0.006)		-		0.0169	A	(0.002)	0.0444	J	(0.0047)
Zinc, total	mg/l	0.02	0.0545	R	(0.008)	0.221	A	(0.0060)	0.143	J	(0.0019)	0.0989	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-18

Chemical Parameter		CRDL	03/15/90			08/15/90			10/16/90			04/17/91		
Aluminum, total	mg/l	0.2	0.092	A	(0.027)		-		0.0964	J	(0.0385)	<0.0215	U	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.0231	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0033	A	(0.002)	0.0049	A	(0.0020)	<0.003	U	(0.003)	0.0033	U	(0.0011)
Barium, total	mg/l	0.2	0.0189	A	(0.002)	0.0151	A	(0.0010)	0.0167	U	(0.0006)	0.0022	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)		-		<0.0003	U	(0.0003)	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	0.0274	A	(0.005)		-		0.0265	A	(0.0017)	0.0239	J	(0.001)
Calcium, total	mg/l	5	84.3	A	(0.02)		-		80.7	A	(0.0327)	109.0	J	(0.0183)
Chromium, total	mg/l	0.01	<0.003	U	(0.003)		-		0.0163	J	(0.0017)	<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	0.0183	A	(0.007)		-		0.0141	A	(0.0017)	0.0135	J	(0.0041)
Copper, total	mg/l	0.025	0.158	A	(0.006)		-		0.152	U	(0.0045)	0.174	A	(0.0049)
Iron, total	mg/l	0.1	0.836	A	(0.003)		-		1.21	J	(0.0114)	1.79	A	(0.0068)
Lead, total	mg/l	0.005	0.002	A	(0.002)		-		<0.001	UJ	(0.001)	0.0022	J	(0.002)
Magnesium, total	mg/l	5	8.66	A	(0.037)		-		7.65	A	(0.0301)	9.32	J	(0.0257)
Manganese, total	mg/l	0.015	0.767	A	(0.001)		-		0.541	J	(0.0005)	0.84	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		<0.1	U	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.012	U	(0.012)		-		0.0146	J	(0.0107)	0.0109	A	(0.0099)
Potassium, total	mg/l	5	6.67	A	(0.9)		-		3.13	J	(0.97)	6.13	A	(0.135)
Selenium, total	mg/l	0.005	<0.002	U	(0.002)		-		<0.003	UJ	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	66.1	A	(0.038)		-		74.1	A	(0.0116)	46.3	J	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		0.0027	J	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.006	U	(0.006)		-		<0.002	U	(0.002)	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	8.04	J	(0.008)	8.43	A	(0.0060)	7.35	J	(0.0019)	9.4	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-18A

Chemical Parameter		CRDL	03/15/90			06/14/90			10/16/90			04/17/91		
Aluminum, total	mg/l	0.2	0.749	A	(0.027)		-		0.2070	J	(0.0385)	0.922	J	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.0274	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0097	A	(0.002)	<0.002	U	(0.0020)	<0.003	U	(0.003)	0.012	J	(0.0011)
Barium, total	mg/l	0.2	0.0205	A	(0.002)	0.0452	A	(0.0010)	0.0234	U	(0.0006)	0.0061	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.001	U	(0.001)		-		<0.0003	U	(0.0003)	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	0.0203	A	(0.005)		-		0.0065	U	(0.0017)	0.0196	J	(0.001)
Calcium, total	mg/l	5	116.0	A	(0.02)		-		72.7	A	(0.0327)	128.0	J	(0.0183)
Chromium, total	mg/l	0.01	0.0047	A	(0.003)		-		0.0026	U	(0.0017)	0.0053	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0195	A	(0.007)		-		0.0046	U	(0.0017)	0.0124	J	(0.0041)
Copper, total	mg/l	0.025	0.145	A	(0.006)		-		0.0422	U	(0.0045)	0.112	A	(0.0049)
Iron, total	mg/l	0.1	11.6	A	(0.003)		-		2.99	J	(0.0114)	7.42	A	(0.0068)
Lead, total	mg/l	0.005	0.0135	A	(0.002)		-		0.002	U	(0.001)	0.0227	J	(0.002)
Magnesium, total	mg/l	5	9.48	A	(0.037)		-		4.18	A	(0.0301)	8.43	J	(0.0257)
Manganese, total	mg/l	0.015	0.665	A	(0.001)		-		0.117	J	(0.0005)	0.484	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		<0.1	U	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.012	U	(0.012)		-		<0.0107	U	(0.0107)	0.011	A	(0.0099)
Potassium, total	mg/l	5	5.39	A	(0.9)		-		2.13	J	(0.97)	4.98	A	(0.135)
Selenium, total	mg/l	0.005	0.0056	A	(0.002)		-		0.005	J	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	33.3	A	(0.038)		-		19.6	A	(0.0116)	21.5	J	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		<0.002	U	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.006	U	(0.006)		-		<0.002	U	(0.002)	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	7.87	J	(0.008)	0.239	A	(0.0060)	1.8	J	(0.0019)	7.3	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-22

Chemical Parameter		CRDL	03/21/90			06/17/90			10/17/90			04/16/91		
Aluminum, total	mg/l	0.2	40.8	A	(0.027)		-		2.27	J	(0.0385)	0.515	J	(0.0215)
Antimony, total	mg/l	0.06	<0.037	U	(0.037)		-		0.0517	A	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.0227	A	(0.002)	<0.002	U	(0.002)	<0.003	U	(0.003)	<0.0018	U	(0.0011)
Barium, total	mg/l	0.2	0.276	A	(0.002)	0.0769	A	(0.001)	0.0902	A	(0.0006)	0.0805	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0011	A	(0.001)		-		<0.0003	U	(0.0003)	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.005	U	(0.005)		-		<0.0017	U	(0.0017)	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	197.0	A	(0.02)		-		231.0	A	(0.0327)	387.0	J	(0.0183)
Chromium, total	mg/l	0.01	0.153	A	(0.003)		-		0.0134	U	(0.0017)	0.0058	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0404	A	(0.007)		-		0.0192	A	(0.0017)	0.0085	J	(0.0041)
Copper, total	mg/l	0.025	0.191	A	(0.006)		-		0.198	U	(0.0045)	0.0611	J	(0.0049)
Iron, total	mg/l	0.1	50.2	A	(0.003)		-		14.5	J	(0.0114)	4.31	A	(0.0068)
Lead, total	mg/l	0.005	0.0445	A	(0.002)		-		0.0014	U	(0.001)	0.0046	J	(0.002)
Magnesium, total	mg/l	5	63.5	A	(0.037)		-		44.1	A	(0.0301)	45.3	J	(0.0257)
Manganese, total	mg/l	0.015	3.48	A	(0.001)		-		1.68	J	(0.0005)	2.2	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.2	U	(0.2)		-		<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	0.0666	A	(0.012)		-		0.0472	J	(0.0107)	0.0118	A	(0.0099)
Potassium, total	mg/l	5	18.3	A	(0.9)		-		12.4	A	(0.97)	11.5	A	(0.135)
Selenium, total	mg/l	0.005	<0.002	U	(0.002)		-		<0.003	UJ	(0.003)	0.0160	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.003	U	(0.003)		-		0.0212	J	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	27.5	A	(0.038)		-		16.0	A	(0.0116)	12.8	J	(0.07)
Thallium, total	mg/l	0.01	<0.004	U	(0.004)		-		<0.002	U	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0709	A	(0.006)		-		0.0073	A	(0.002)	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.135	J	(0.008)	0.0501	J	(0.006)	0.0976	J	(0.0019)	0.117	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-37

Chemical Parameter		CRDL	10/18/90			04/16/91		
Aluminum, total	mg/l	0.2	0.419	J	(0.0385)	29.6	J	(0.0215)
Antimony, total	mg/l	0.06	0.0202	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.614	A	(0.003)	0.551	A	(0.0265)
Barium, total	mg/l	0.2	0.0326	U	(0.0006)	0.198	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0003	U	(0.0003)	0.0006	J	(0.0002)
Cadmium, total	mg/l	0.005	0.003	A	(0.0017)	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	48.6	A	(0.0327)	65.1	J	(0.0183)
Chromium, total	mg/l	0.01	0.0048	J	(0.0017)	0.133	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0049	U	(0.0017)	0.0207	J	(0.0041)
Copper, total	mg/l	0.025	0.0942	U	(0.0045)	0.109	A	(0.0049)
Iron, total	mg/l	0.1	2.48	J	(0.0114)	43.5	A	(0.0068)
Lead, total	mg/l	0.005	0.0043	U	(0.001)	0.027	J	(0.002)
Magnesium, total	mg/l	5	6.44	A	(0.0301)	20.0	J	(0.0257)
Manganese, total	mg/l	0.015	0.537	J	(0.0005)	0.692	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0107	U	(0.0107)	0.0603	A	(0.0099)
Potassium, total	mg/l	5	2.54	J	(0.97)	11.9	A	(0.135)
Selenium, total	mg/l	0.005	<0.003	UJ	(0.003)	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	26.2	A	(0.0116)	21.8	J	(0.07)
Thallium, total	mg/l	0.01	<0.002	U	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.002	U	(0.002)	0.0799	A	(0.0047)
Zinc, total	mg/l	0.02	0.025	U	(0.0019)	0.245	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-38

Chemical Parameter		CRDL	10/17/90			10/17/90 Replicate			04/12/91		
Aluminum, total	mg/l	0.2	2.5	J	(0.0385)	1.15	J	(0.0385)	0.467	J	(0.0215)
Antimony, total	mg/l	0.06	0.0426	A	(0.0096)	0.0334	A	(0.0096)	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.222	A	(0.003)	0.173	A	(0.003)	0.237	J	(0.0011)
Barium, total	mg/l	0.2	0.0528	A	(0.0006)	0.0307	U	(0.0006)	0.0293	A	(0.0011)
Beryllium, total	mg/l	0.005	<0.0003	U	(0.0003)	<0.0003	U	(0.0003)	0.0003	U	(0.0002)
Cadmium, total	mg/l	0.005	0.003	A	(0.0017)	<0.0017	U	(0.0017)	<0.001	U	(0.001)
Calcium, total	mg/l	5	120.0	A	(0.0327)	122.0	A	(0.0327)	180.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.009	U	(0.0017)	0.0045	J	(0.0017)	0.0059	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0264	A	(0.0017)	0.0329	U	(0.0017)	0.0576	J	(0.0041)
Copper, total	mg/l	0.025	0.072	U	(0.0045)	0.092	U	(0.0045)	0.0127	J	(0.0049)
Iron, total	mg/l	0.1	6.81	J	(0.0114)	3.71	J	(0.0114)	33.1	J	(0.0068)
Lead, total	mg/l	0.005	0.0262	J	(0.001)	0.0093	J	(0.001)	0.0126	J	(0.002)
Magnesium, total	mg/l	5	5.63	A	(0.0301)	5.05	A	(0.0301)	5.08	A	(0.0257)
Manganese, total	mg/l	0.015	0.431	J	(0.0005)	0.389	J	(0.0005)	0.389	J	(0.0012)
Mercury, total	mg/l	0.0002	0.23	J	(0.1)	0.14	J	(0.1)	0.0003	J	(0.0001)
Nickel, total	mg/l	0.04	0.0626	J	(0.0107)	0.0809	J	(0.0107)	0.151	A	(0.0099)
Potassium, total	mg/l	5	6.82	A	(0.97)	5.91	A	(0.97)	5.78	J	(0.135)
Selenium, total	mg/l	0.005	0.0052	J	(0.003)	0.0053	J	(0.003)	0.0056	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0084	UJ	(0.0084)	<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	24.9	A	(0.0116)	21.7	A	(0.0116)	21.1	A	(0.07)
Thallium, total	mg/l	0.01	<0.002	U	(0.002)	<0.002	U	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0253	A	(0.002)	0.0191	A	(0.002)	0.0203	A	(0.0047)
Zinc, total	mg/l	0.02	0.321	J	(0.0019)	0.0415	U	(0.0019)	0.588	A	(0.0034)

Explanation

. CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

			Monitoring Well: OW-40					
Chemical Parameter		CRDL	10/15/90			04/12/91		
Aluminum, total	mg/l	0.2	13.1	J	(0.0385)	37.4	J	(0.0215)
Antimony, total	mg/l	0.06	0.143	J	(0.0096)	0.0265	J	(0.0223)
Arsenic, total	mg/l	0.01	0.09	A	(0.003)	0.322	J	(0.0011)
Barium, total	mg/l	0.2	0.17	A	(0.0006)	0.162	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0032	A	(0.0003)	0.0022	J	(0.0002)
Cadmium, total	mg/l	0.005	0.0035	U	(0.0017)	0.0039	J	(0.001)
Calcium, total	mg/l	5	491.0	A	(0.0327)	647.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.196	J	(0.0017)	0.573	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0517	A	(0.0017)	0.0658	J	(0.0041)
Copper, total	mg/l	0.025	0.298	U	(0.0045)	0.814	J	(0.0049)
Iron, total	mg/l	0.1	15.4	J	(0.0114)	39.4	A	(0.0068)
Lead, total	mg/l	0.005	0.0994	J	(0.001)	0.343	J	(0.002)
Magnesium, total	mg/l	5	10.4	A	(0.0301)	15.3	A	(0.0257)
Manganese, total	mg/l	0.015	0.243	J	(0.0005)	0.275	J	(0.0012)
Mercury, total	mg/l	0.0002	1.6	A	(0.1)	0.0019	J	(0.0001)
Nickel, total	mg/l	0.04	0.0371	J	(0.0107)	0.0379	A	(0.0099)
Potassium, total	mg/l	5	5.9	J	(0.97)	7.87	J	(0.135)
Selenium, total	mg/l	0.005	0.078	J	(0.003)	0.182	J	(0.0032)
Silver, total	mg/l	0.01	<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	12.0	A	(0.0116)	6.41	J	(0.07)
Thallium, total	mg/l	0.01	<0.002	UJ	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0465	A	(0.002)	0.0612	J	(0.0047)
Zinc, total	mg/l	0.02	0.312	J	(0.0019)	0.884	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-42

Chemical Parameter		CRDL	10/15/90			04/18/91		
Aluminum, total	mg/l	0.2	15.1	J	(0.0385)	0.117	U	(0.0215)
Antimony, total	mg/l	0.06	0.0127	J	(0.0096)	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.482	A	(0.003)	0.167	A	(0.0011)
Barium, total	mg/l	0.2	0.287	A	(0.0006)	0.0444	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0007	A	(0.0003)	0.0005	U	(0.0002)
Cadmium, total	mg/l	0.005	0.0034	U	(0.0017)	0.001	J	(0.001)
Calcium, total	mg/l	5	47.3	A	(0.0327)	526.0	J	(0.0183)
Chromium, total	mg/l	0.01	0.0352	J	(0.0017)	0.0331	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0373	A	(0.0017)	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.0284	U	(0.0045)	0.0183	U	(0.0049)
Iron, total	mg/l	0.1	47.3	J	(0.0114)	11.4	J	(0.0068)
Lead, total	mg/l	0.005	0.0165	J	(0.001)	<0.002	UJ	(0.002)
Magnesium, total	mg/l	5	34.8	A	(0.0301)	92.2	J	(0.0257)
Manganese, total	mg/l	0.015	1.87	J	(0.0005)	0.469	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.1	UJ	(0.1)	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	0.0332	J	(0.0107)	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	15.1	J	(0.97)	7.12	J	(0.135)
Selenium, total	mg/l	0.005	<0.003	UJ	(0.003)	0.016	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0084	UJ	(0.0084)	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	35.4	A	(0.0116)	113.0	J	(0.07)
Thallium, total	mg/l	0.01	<0.002	UJ	(0.002)	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0352	A	(0.002)	0.0233	J	(0.0047)
Zinc, total	mg/l	0.02	0.071	J	(0.0019)	0.0127	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-43

Chemical Parameter		CRDL	04/16/91		
Aluminum, total	mg/l	0.2	24.8	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.685	A	(0.0265)
Barium, total	mg/l	0.2	0.187	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0005	J	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	372.0	J	(0.0183)
Chromium, total	mg/l	0.01	0.051	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0324	J	(0.0041)
Copper, total	mg/l	0.025	0.259	J	(0.0049)
Iron, total	mg/l	0.1	34.0	A	(0.0068)
Lead, total	mg/l	0.005	0.626	A	(0.002)
Magnesium, total	mg/l	5	35.7	J	(0.0257)
Manganese, total	mg/l	0.015	3.92	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0014	J	(0.0001)
Nickel, total	mg/l	0.04	0.0324	A	(0.0099)
Potassium, total	mg/l	5	22.3	A	(0.135)
Selenium, total	mg/l	0.005	0.0199	J	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	62.8	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0589	J	(0.0047)
Zinc, total	mg/l	0.02	0.156	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-44

Chemical Parameter		CRDL	04/17/91		
Aluminum, total	mg/l	0.2	8.62	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0092	A	(0.0011)
Barium, total	mg/l	0.2	0.0375	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0007	J	(0.0002)
Cadmium, total	mg/l	0.005	0.0043	J	(0.001)
Calcium, total	mg/l	5	99.3	J	(0.0183)
Chromium, total	mg/l	0.01	0.0084	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0461	J	(0.0041)
Copper, total	mg/l	0.025	4.17	A	(0.0049)
Iron, total	mg/l	0.1	20.8	J	(0.0068)
Lead, total	mg/l	0.005	0.103	J	(0.002)
Magnesium, total	mg/l	5	9.65	J	(0.0257)
Manganese, total	mg/l	0.015	2.83	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0002	J	(0.0001)
Nickel, total	mg/l	0.04	0.0586	A	(0.0099)
Potassium, total	mg/l	5	8.88	A	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	50.0	J	(0.07)
Thallium, total	mg/l	0.01	0.0047	J	(0.0019)
Vanadium, total	mg/l	0.05	0.0058	A	(0.0047)
Zinc, total	mg/l	0.02	0.707	A	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-45

Chemical Parameter		CRDL	04/17/91		
Aluminum, total	mg/l	0.2	1.61	J	(0.0215)
Antimony, total	mg/l	0.06	0.076	A	(0.0223)
Arsenic, total	mg/l	0.01	1.26	A	(0.0265)
Barium, total	mg/l	0.2	0.0243	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	97.7	J	(0.0183)
Chromium, total	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.0174	A	(0.0049)
Iron, total	mg/l	0.1	5.28	A	(0.0068)
Lead, total	mg/l	0.005	0.0698	J	(0.002)
Magnesium, total	mg/l	5	35.3	J	(0.0257)
Manganese, total	mg/l	0.015	0.341	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0014	J	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	16.4	A	(0.135)
Selenium, total	mg/l	0.005	0.0126	J	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	28.1	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.0291	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-46

Chemical Parameter		CRDL	04/16/91		
Aluminum, total	mg/l	0.2	0.476	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0837	J	(0.0011)
Barium, total	mg/l	0.2	0.0174	A	(0.0011)
Beryllium, total	mg/l	0.005	0.0004	U	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	U	(0.001)
Calcium, total	mg/l	5	79.3	A	(0.0183)
Chromium, total	mg/l	0.01	0.006	A	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	<0.0049	UJ	(0.0049)
Iron, total	mg/l	0.1	13.9	J	(0.0068)
Lead, total	mg/l	0.005	<0.002	UJ	(0.002)
Magnesium, total	mg/l	5	7.77	A	(0.0257)
Manganese, total	mg/l	0.015	0.863	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	17.4	J	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	102.0	A	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0049	A	(0.0047)
Zinc, total	mg/l	0.02	0.0152	U	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-46DUP

Chemical Parameter		CRDL	04/16/91		
Aluminum, total	mg/l	0.2	1.34	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0862	J	(0.0011)
Barium, total	mg/l	0.2	0.0216	A	(0.0011)
Beryllium, total	mg/l	0.005	0.0005	U	(0.0002)
Cadmium, total	mg/l	0.005	0.0015	A	(0.001)
Calcium, total	mg/l	5	80.8	A	(0.0183)
Chromium, total	mg/l	0.01	0.0073	A	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.008	J	(0.0049)
Iron, total	mg/l	0.1	12.8	J	(0.0068)
Lead, total	mg/l	0.005	0.0036	J	(0.002)
Magnesium, total	mg/l	5	8.54	A	(0.0257)
Manganese, total	mg/l	0.015	0.831	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	16.8	J	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	97.8	A	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0062	A	(0.0047)
Zinc, total	mg/l	0.02	0.0403	A	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-47

Chemical Parameter		CRDL	04/16/91		
Aluminum, total	mg/l	0.2	1.12	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.653	A	(0.0265)
Barium, total	mg/l	0.2	0.0292	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	609.0	J	(0.0183)
Chromium, total	mg/l	0.01	<0.0043	U	(0.0043)
Cobalt, total	mg/l	0.05	0.0044	J	(0.0041)
Copper, total	mg/l	0.025	0.137	J	(0.0049)
Iron, total	mg/l	0.1	20.7	A	(0.0068)
Lead, total	mg/l	0.005	0.0358	J	(0.002)
Magnesium, total	mg/l	5	8.82	J	(0.0257)
Manganese, total	mg/l	0.015	0.695	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0006	J	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	15.5	A	(0.135)
Selenium, total	mg/l	0.005	0.016	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	57.8	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.542	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-48

Chemical Parameter		CRDL	04/12/91		
Aluminum, total	mg/l	0.2	0.162	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0863	J	(0.0011)
Barium, total	mg/l	0.2	0.0137	U	(0.0011)
Beryllium, total	mg/l	0.005	0.0005	U	(0.0002)
Cadmium, total	mg/l	0.005	0.0052	A	(0.001)
Calcium, total	mg/l	5	126.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.0082	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0107	J	(0.0041)
Copper, total	mg/l	0.025	0.0584	J	(0.0049)
Iron, total	mg/l	0.1	7.5	J	(0.0068)
Lead, total	mg/l	0.005	0.012	J	(0.002)
Magnesium, total	mg/l	5	7.77	A	(0.0257)
Manganese, total	mg/l	0.015	0.535	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	6.12	J	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	89.0	A	(0.07)
Thallium, total	mg/l	0.01	<0.0019	UJ	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	3.86	A	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-48A

Chemical Parameter		CRDL	04/12/91		
Aluminum, total	mg/l	0.2	0.638	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.812	A	(0.0011)
Barium, total	mg/l	0.2	0.0425	J	(0.0011)
Beryllium, total	mg/l	0.005	0.0009	U	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	141.0	A	(0.0183)
Chromium, total	mg/l	0.01	0.0118	A	(0.0043)
Cobalt, total	mg/l	0.05	0.363	J	(0.0041)
Copper, total	mg/l	0.025	0.0142	U	(0.0049)
Iron, total	mg/l	0.1	249.0	J	(0.0068)
Lead, total	mg/l	0.005	0.0114	J	(0.002)
Magnesium, total	mg/l	5	15.0	A	(0.0257)
Manganese, total	mg/l	0.015	2.16	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	0.0273	A	(0.0099)
Potassium, total	mg/l	5	8.98	J	(0.135)
Selenium, total	mg/l	0.005	0.0064	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	100.0	A	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.0222	J	(0.0047)
Zinc, total	mg/l	0.02	10.6	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-49

Chemical Parameter		CRDL	04/17/91		
Aluminum, total	mg/l	0.2	<0.0215	U	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0389	A	(0.0011)
Barium, total	mg/l	0.2	0.0047	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	49.2	J	(0.0183)
Chromium, total	mg/l	0.01	0.006	A	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.0089	A	(0.0049)
Iron, total	mg/l	0.1	4.26	A	(0.0068)
Lead, total	mg/l	0.005	0.0059	J	(0.002)
Magnesium, total	mg/l	5	3.26	J	(0.0257)
Manganese, total	mg/l	0.015	0.305	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	3.16	A	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	38.3	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.142	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-49A

Chemical Parameter		CRDL	04/18/91		
Aluminum, total	mg/l	0.2	2.82	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0909	A	(0.0011)
Barium, total	mg/l	0.2	0.0165	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	0.0013	J	(0.001)
Calcium, total	mg/l	5	55.5	J	(0.0183)
Chromium, total	mg/l	0.01	0.0279	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0077	J	(0.0041)
Copper, total	mg/l	0.025	0.0943	A	(0.0049)
Iron, total	mg/l	0.1	6.0	J	(0.0068)
Lead, total	mg/l	0.005	0.0325	J	(0.002)
Magnesium, total	mg/l	5	5.26	J	(0.0257)
Manganese, total	mg/l	0.015	0.474	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0003	J	(0.0001)
Nickel, total	mg/l	0.04	0.0105	A	(0.0099)
Potassium, total	mg/l	5	5.71	A	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	40.3	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	0.007	A	(0.0047)
Zinc, total	mg/l	0.02	2.95	A	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-49DUP

Chemical Parameter		CRDL	04/17/91		
Aluminum, total	mg/l	0.2	0.0451	U	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0422	A	(0.0011)
Barium, total	mg/l	0.2	0.0035	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	<0.001	UJ	(0.001)
Calcium, total	mg/l	5	52.6	J	(0.0183)
Chromium, total	mg/l	0.01	0.0077	A	(0.0043)
Cobalt, total	mg/l	0.05	<0.0041	U	(0.0041)
Copper, total	mg/l	0.025	0.0085	A	(0.0049)
Iron, total	mg/l	0.1	4.62	A	(0.0068)
Lead, total	mg/l	0.005	0.0066	J	(0.002)
Magnesium, total	mg/l	5	3.49	J	(0.0257)
Manganese, total	mg/l	0.015	0.323	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	3.34	A	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	40.8	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	0.131	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-50

Chemical Parameter		CRDL	04/18/91		
Aluminum, total	mg/l	0.2	0.439	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	UJ	(0.0223)
Arsenic, total	mg/l	0.01	0.128	A	(0.0011)
Barium, total	mg/l	0.2	0.0759	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	U	(0.0002)
Cadmium, total	mg/l	0.005	0.0202	J	(0.001)
Calcium, total	mg/l	5	250.0	J	(0.0183)
Chromium, total	mg/l	0.01	0.0221	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0256	J	(0.0041)
Copper, total	mg/l	0.025	0.0285	U	(0.0049)
Iron, total	mg/l	0.1	44.4	J	(0.0068)
Lead, total	mg/l	0.005	0.0152	J	(0.002)
Magnesium, total	mg/l	5	20.5	J	(0.0257)
Manganese, total	mg/l	0.015	1.61	J	(0.0012)
Mercury, total	mg/l	0.0002	<0.0001	UJ	(0.0001)
Nickel, total	mg/l	0.04	0.0275	A	(0.0099)
Potassium, total	mg/l	5	11.9	J	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	216.0	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	12.0	J	(0.0034)

Explanation

CRDL Contract Required Detection Limit
N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

Table 4

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: Total Metals

Monitoring Well: OW-50A

Chemical Parameter		CRDL	04/16/91		
Aluminum, total	mg/l	0.2	1.52	J	(0.0215)
Antimony, total	mg/l	0.06	<0.0223	U	(0.0223)
Arsenic, total	mg/l	0.01	0.0721	A	(0.0011)
Barium, total	mg/l	0.2	0.0464	J	(0.0011)
Beryllium, total	mg/l	0.005	<0.0002	UJ	(0.0002)
Cadmium, total	mg/l	0.005	0.0118	J	(0.001)
Calcium, total	mg/l	5	92.9	J	(0.0183)
Chromium, total	mg/l	0.01	0.391	A	(0.0043)
Cobalt, total	mg/l	0.05	0.0066	J	(0.0041)
Copper, total	mg/l	0.025	0.104	A	(0.0049)
Iron, total	mg/l	0.1	4.63	A	(0.0068)
Lead, total	mg/l	0.005	0.286	J	(0.002)
Magnesium, total	mg/l	5	6.23	J	(0.0257)
Manganese, total	mg/l	0.015	0.434	J	(0.0012)
Mercury, total	mg/l	0.0002	0.0009	J	(0.0001)
Nickel, total	mg/l	0.04	<0.0099	U	(0.0099)
Potassium, total	mg/l	5	4.31	A	(0.135)
Selenium, total	mg/l	0.005	<0.0032	UJ	(0.0032)
Silver, total	mg/l	0.01	<0.0058	U	(0.0058)
Sodium, total	mg/l	5	32.7	J	(0.07)
Thallium, total	mg/l	0.01	<0.0019	U	(0.0019)
Vanadium, total	mg/l	0.05	<0.0047	U	(0.0047)
Zinc, total	mg/l	0.02	4.27	J	(0.0034)

Explanation
- CRDL Contract Required Detection Limit
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated

Values in parentheses are the Instrument Detection Limits for the respective analyses

TABLE 5

Qualified Data for General
Water Quality Parameters

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

QA/QC Sample: 01EQB

Chemical Parameter		04/11/91		
pH (Field)	std	5.945	F	(N/R)
Specific Conductance (Field)	umhos/cm	50	F	(N/R)
Temperature (Field)	Deg. C	20.5	F	(N/R)
Redox Potential (Field)	mv	224	F	(N/R)
Total Organic Carbon (TOC)	mg/l	<1.0	U	(1.0)
Chemical Oxygen Demand (COD	mg/l	<10.0	U	(10.0)
Total Dissolved Solids (TDS)	mg/l	56	A	(10)
Ammonia as N	mg/l	3.7	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	3.7	J	(0.2)

Explanation
N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

QA/QC Sample: 02EQB

Chemical Parameter		04/18/91		
pH (Field)	std	6.435	F	(N/R)
Specific Conductance (Field)	umhos/cm	1.6	F	(N/R)
Temperature (Field)	Deg. C	14.4	F	(N/R)
Redox Potential (Field)	mv	177	F	(N/R)
Total Organic Carbon (TOC)	mg/l	<1.0	U	(1.0)
Chemical Oxygen Demand (COD	mg/l	<10.0	U	(10.0)
Total Dissolved Solids (TDS)	mg/l	41	U	(10)
Ammonia as N	mg/l	0.9	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	0.9	U	(0.2)

Explanation

N/R Not Reported

- Not Analyzed

Validation Codes

A Quantitative Data

J Qualitative Data

R Unusable Data

U Chemical Parameter Not Detected

UJ Chemical Parameter Not Detected, Detection Level Estimated

F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-9

Chemical Parameter		03/19/90			06/17/90			10/18/90			04/16/91		
pH (Field)	std	7.38	F	(0.01)	–			6.13	F	(N/R)	7.625	F	(N/R)
Specific Conductance (Field)	umhos/cm	920.0	F	(N/R)	890.0	F	(N/R)	1020.0	F	(N/R)	980	F	(N/R)
Temperature (Field)	Deg. C	11.0	F	(0.1)	11.0	F	(0.1)	9.0	F	(N/R)	9.3	F	(N/R)
Redox Potential (Field)	mv	-174.5	F	(N/R)	164.8	F	(N/R)				157.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l	14.1	R	(20.5)	29.2	A	(0.5)				38.5	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	62.1	A	(20.0)	–						129.5	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–		–						900	A	(10)
Ammonia as N	mg/l		–		–						<2.0	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		–		–						3.5	U	(0.2)

Explanation

N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-12

Chemical Parameter		03/15/90			04/25/90			08/15/90			10/15/90			04/18/91		
pH (Field)	std	7.15	F	(0.01)	6.79	F	(0.01)		-		8.19	F	(N/R)	7.155	F	(N/R)
Specific Conductance (Field)	umhos/cm	4200.0	F	(N/R)	4090.0	F	(N/R)	3610.0	F	(N/R)	5800.0	F	(N/R)	4300	F	(N/R)
Temperature (Field)	Deg.-C	9.5	F	(0.1)	10.0	F	(0.1)	15.5	F	(0.1)	12.0	F	(N/R)	9.6	F	(N/R)
Redox Potential (Field)	mv	-91.7	F	(N/R)	-54.9	F	(N/R)	-56.1	F	(N/R)		-		-111	F	(N/R)
Total Organic Carbon (TOC)	mg/l	29.1	J	(20.5)		-		40.0	A	(0.5)		-		33.88	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	144.0	A	(20.0)		-			-			-		97.3	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		-			-			-			-		420	J	(10)
Ammonia as N	mg/l		-			-			-			-		2.7	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-			-			-			-		3.9	U	(0.2)

Explanation
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW–14

Chemical Parameter		03/15/90			06/16/90			04/12/91		
pH (Field)	std	5.87	F	(0.01)	–			6.445	F	(N/R)
Specific Conductance (Field)	umhos/cm	520.0	F	(N/R)	620.0	F	(N/R)	680	F	(N/R)
Temperature (Field)	Deg. C	8.5	F	(0.1)	15.0	F	(0.1)	11.2	F	(N/R)
Redox Potential (Field)	mv	178.4	F	(N/R)	205.9	F	(N/R)	305	F	(N/R)
Total Organic Carbon (TOC)	mg/l	5.1	R	(20.5)	10.0	A	(0.05)	7.65	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	<20.0	U	(20.0)	–			17.0	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	–			–			510	J	(10)
Ammonia as N	mg/l	–			–			1.1	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	–			–			1.4	U	(0.2)

Explanation
N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-17

Chemical Parameter		03/15/90			04/25/90			08/14/90			10/16/90			4/11/91		
pH (Field)	std	7.01	F	(0.01)	7.21	F	(0.01)	–			6.95	F	(N/R)	6.76	F	(N/R)
Specific Conductance (Field)	umhos/cm	5670.0	F	(N/R)	4240.0	F	(N/R)	4840.0	F	(N/R)	470.0	F	(N/R)	7850	F	(N/R)
Temperature (Field)	Deg. C	9.5	F	(0.1)	9.5	F	(0.1)	16.0	F	(0.1)	11.0	F	(N/R)	15.4	F	(N/R)
Redox Potential (Field)	mv	-85.0	F	(N/R)	-25.3	F	(N/R)	-89.6	F	(N/R)		–		-31.85	F	(N/R)
Total Organic Carbon (TOC)	mg/l	160.0	J	(20.5)		–		120.0	A	(0.5)		–		313.15	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	454.0	A	(20.0)		–			–			–		1030	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–			–			–			–		7800	A	(10)
Ammonia as N	mg/l		–			–			–			–		280	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		–			–			–			–		280	J	(0.2)

Explanation

N/R Not Reported

– *Not Analyzed*

Validation Codes

A Quantitative Data

J Qualitative Data

R Unusable Data

U Chemical Parameter Not Detected

UJ Chemical Parameter Not Detected, Detection Level Estimated

F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-18

Chemical Parameter		03/15/90			04/25/90			08/15/90			10/16/90			04/17/91		
pH (Field)	std	5.65	F	(0.01)	5.74	F	(0.01)		-		5.48	F	(N/R)	6.015	F	(N/R)
Specific Conductance (Field)	umhos/cm	1020.0	F	(N/R)	1050.0	F	(N/R)	940.0	F	(N/R)	966.0	F	(N/R)	1500	F	(N/R)
Temperature (Field)	Deg. C	10.5	F	(0.1)	9.0	F	(0.1)	14.0	F	(0.1)	11.0	F	(N/R)	10.1	F	(N/R)
Redox Potential (Field)	mv	191.7	F	(N/R)	207.0	F	(N/R)	217.0	F	(N/R)		-		227	F	(N/R)
Total Organic Carbon (TOC)	mg/l	5.1	R	(20.5)		-		14.6	A	(0.5)		-		6.126	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	<20.0	U	(20.0)		-			-			-		11.8	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		-			-			-			-		670	A	(10)
Ammonia as N	mg/l		-			-			-			-		22	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-			-			-			-		23	J	(0.2)

Explanation
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW–18A

Chemical Parameter		03/15/90			06/14/90			10/16/90			04/17/91		
pH (Field)	std	6.27	F	(0.01)		–		5.83	F	(N/R)	6.08	F	(N/R)
Specific Conductance (Field)	umhos/cm	860.0	F	(N/R)	810.0	F	(N/R)	590.0	F	(N/R)	800	F	(N/R)
Temperature (Field)	Deg. C	10.0	F	(0.1)	16.0	F	(0.1)	13.0	F	(N/R)	9.0	F	(N/R)
Redox Potential (Field)	mv	207.0	F	(N/R)	215.3	F	(N/R)		–		203	F	(N/R)
Total Organic Carbon (TOC)	mg/l	5.5	A	(20.5)	13.4	A	(0.05)		–		7.25	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	52.3	A	(20.0)		–			–		16.5	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–			–			–		620	A	(10)
Ammonia as N	mg/l		–			–			–		8.4	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		–			–			–		8.9	U	(0.2)

Explanation

N/R Not Reported

– Not Analyzed

Validation Codes

A Quantitative Data

J Qualitative Data

R Unusable Data

U Chemical Parameter Not Detected

UJ Chemical Parameter Not Detected, Detection Level Estimated

F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-22

Chemical Parameter		03/21/90			06/17/90			10/17/90			04/16/91			4/18/91		
pH (Field)	std	6.34	F	(0.01)	–			6.15	F	(N/R)	6.545	F	(N/R)	6.81	F	(N/R)
Specific Conductance (Field)	umhos/cm	1900.0	F	(N/R)	1890.0	F	(N/R)	2100.0	F	(N/R)	2100	F	(N/R)	2100	F	(N/R)
Temperature (Field)	Deg. C	6.5	F	(0.1)	15.0	F	(0.1)	14.0	F	(N/R)	12.4	F	(N/R)	8.3	F	(N/R)
Redox Potential (Field)	mv	-25.6	F	(N/R)	–			–			217	F	(N/R)	166	F	(N/R)
Total Organic Carbon (TOC)	mg/l	11.5	R	(20.5)	15.3	A	(0.05)	–			–			11.54	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	24.4	A	(20.0)	–			–			–			35.8	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–		–			–			–			1690	A	(10)
Ammonia as N	mg/l		–		–			–			–			23	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		–		–			–			–			23	J	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

		Monitoring Well: OW–37					
Chemical Parameter		**10/18/90**			**04/16/91**		
pH (Field)	std	6.09	F	(N/R)	6.88	F	(N/R)
Specific Conductance (Field)	umhos/cm	600.0	F	(N/R)	540	F	(N/R)
Temperature (Field)	Deg. C	13.0	F	(N/R)	14.3	F	(N/R)
Redox Potential (Field)	mv		–		212	F	(N/R)
Total Organic Carbon (TOC)	mg/l		–		7.37	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		–		24.4	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–		320	A	(10)
monia as N	mg/l		–		5.4	U	(0.2)
ogen, Total Kjeldahl (TKN)	mg/l		–		6.6	U	(0.2)

ation
Not Reported
Not Analyzed
ation Codes
Quantitative Data
Qualitative Data
Unusable Data
Chemical Parameter Not Detected
Chemical Parameter Not Detected, Detection Level Estimated
Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW-38					
		10/17/90			04/12/91		
pH (Field)	std	5.78	F	(N/R)	6.495	F	(N/R)
Specific Conductance (Field)	umhos/cm	780.0	F	(N/R)	815	F	(N/R)
Temperature (Field)	Deg. C	15.0	F	(N/R)	8.3	F	(N/R)
Redox Potential (Field)	mv		-		142.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l		-		9.6	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		-		<10.0	U	(10.0)
Total Dissolved Solids (TDS)	mg/l		-		1950	J	(10)
Ammonia as N	mg/l		-		0.4	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-		0.4	U	(0.2)

Explanation
N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW–40					
		10/15/90			04/12/91		
pH (Field)	std	6.8	F	(N/R)	6.825	F	(N/R)
Specific Conductance (Field)	umhos/cm	1980.0	F	(N/R)	2400	F	(N/R)
Temperature (Field)	Deg. C	12.0	F	(N/R)	7.6	F	(N/R)
Redox Potential (Field)	mv		–		266	F	(N/R)
Total Organic Carbon (TOC)	mg/l		–		8.5	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		–		16.4	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		–		2260	J	(10)
Ammonia as N	mg/l		–		1.7	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		–		1.7	U	(0.2)

Explanation

N/R Not Reported

– Not Analyzed

Validation Codes

A Quantitative Data

J Qualitative Data

R Unusable Data

U Chemical Parameter Not Detected

UJ Chemical Parameter Not Detected, Detection Level Estimated

F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW-42					
		10/15/90			04/18/91		
pH (Field)	std	8.21	F	(N/R)	7.145	F	(N/R)
Specific Conductance (Field)	umhos/cm	3360.0	F	(N/R)	3600	F	(N/R)
Temperature (Field)	Deg. C	9.0	F	(N/R)	10.2	F	(N/R)
Redox Potential (Field)	mv		-		-124.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l		-		35.55	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		-		102.0	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		-		2820	J	(10)
Ammonia as N	mg/l		-		300	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-		300	J	(0.2)

Explanation
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

		Monitoring Well: OW-43		
Chemical Parameter		**04/16/91**		
pH (Field)	std	6.465	F	(N/R)
Specific Conductance (Field)	umhos/cm	2000	F	(N/R)
Temperature (Field)	Deg. C	12.5	F	(N/R)
Redox Potential (Field)	mv	134	F	(N/R)
Total Organic Carbon (TOC)	mg/l	16.64	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	51.7	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	1730	A	(10)
Ammonia as N	mg/l	1.2	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	5.4	U	(0.2)

Explanation

N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW–44 04/17/91		
pH (Field)	std	5.31	F	(N/R)
Specific Conductance (Field)	umhos/cm	1400	F	(N/R)
Temperature (Field)	Deg. C	8.3	F	(N/R)
Redox Potential (Field)	mv	240	F	(N/R)
Total Organic Carbon (TOC)	mg/l	4.926	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	11.1	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	810	A	(10)
Ammonia as N	mg/l	2.0	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	2.0	U	(0.2)

Explanation
N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-45

Chemical Parameter		04/17/91		
pH (Field)	std	7.735	F	(N/R)
Specific Conductance (Field)	umhos/cm	1400	F	(N/R)
Temperature (Field)	Deg. C	8.4	F	(N/R)
Redox Potential (Field)	mv	111	F	(N/R)
Total Organic Carbon (TOC)	mg/l	32.14	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	91.8	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	860	A	(10)
Ammonia as N	mg/l	37	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	38	J	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW-46		
		04/16/91		
pH (Field)	std	6.85	F	(N/R)
Specific Conductance (Field)	umhos/cm	1000	F	(N/R)
Temperature (Field)	Deg. C	5.4	F	(N/R)
Redox Potential (Field)	mv	85.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l	9.65	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	31.6	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	620	A	(10)
Ammonia as N	mg/l	5.6	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	6.2	U	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW--46DUP					
		04/16/91			04/12/91		
pH (Field)	std	6.92	F	(N/R)	6.99	F	(N/R)
Specific Conductance (Field)	umhos/cm	800	F	(N/R)	110	F	(N/R)
Temperature (Field)	Deg. C	8.4	F	(N/R)	9.7	F	(N/R)
Redox Potential (Field)	mv	129.5	F	(N/R)	-47	F	(N/R)
Total Organic Carbon (TOC)	mg/l		-		32.2	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		-		22.4	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		-		600	J	(10)
Ammonia as N	mg/l		-		6.2	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-		7.2	U	(0.2)

Explanation
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW–47 04/16/91		
pH (Field)	std	6.465	F	(N/R)
Specific Conductance (Field)	umhos/cm	2500	F	(N/R)
Temperature (Field)	Deg. C	14.3	F	(N/R)
Redox Potential (Field)	mv	144	F	(N/R)
Total Organic Carbon (TOC)	mg/l	17.47	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	50.3	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	2260	A	(10)
Ammonia as N	mg/l	10	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	11	U	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

		Monitoring Well: OW–48		
Chemical Parameter		**04/12/91**		
pH (Field)	std	5.845	F	(N/R)
Specific Conductance (Field)	umhos/cm	1200	F	(N/R)
Temperature (Field)	Deg. C	7.6	F	(N/R)
Redox Potential (Field)	mv	175.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l	9.0	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	<10.0	U	(10.0)
Total Dissolved Solids (TDS)	mg/l	830	J	(10)
Ammonia as N	mg/l	2.4	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	2.8	U	(0.2)

Explanation

N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW–48A 04/12/91		
pH (Field)	std	5.63	F	(N/R)
Specific Conductance (Field)	umhos/cm	2250	F	(N/R)
Temperature (Field)	Deg. C	7.4	F	(N/R)
Redox Potential (Field)	mv	256.5	F	(N/R)
Total Organic Carbon (TOC)	mg/l	8.1	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	45.4	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	1500	J	(10)
Ammonia as N	mg/l	20	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	20	J	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-49

Chemical Parameter		04/17/91		
pH (Field)	std	6.645	F	(N/R)
Specific Conductance (Field)	umhos/cm	545	F	(N/R)
Temperature (Field)	Deg. C	9.9	F	(N/R)
Redox Potential (Field)	mv	141	F	(N/R)
Total Organic Carbon (TOC)	mg/l	3.896	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	10.4	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	380	A	(10)
Ammonia as N	mg/l	1.9	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	2.2	U	(0.2)

Explanation

N/R Not Reported
- Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW–49A 04/18/91		
pH (Field)	std	6.455	F	(N/R)
Specific Conductance (Field)	umhos/cm	830	F	(N/R)
Temperature (Field)	Deg. C	10.3	F	(N/R)
Redox Potential (Field)	mv	57	F	(N/R)
Total Organic Carbon (TOC)	mg/l	10.165	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	22.9	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	330	J	(10)
Ammonia as N	mg/l	25	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	30	J	(0.2)

Explanation
N/R Not Reported
– Not Analyzed
Validation Codes
A Quantitative Data
J Qualitative Data
R Unusable Data
U Chemical Parameter Not Detected
UJ Chemical Parameter Not Detected, Detection Level Estimated
F Field Data

Table 5

Summary of Ground–Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground–Water Investigation, Industri–Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW–49DUP

Chemical Parameter		04/17/91		
pH (Field)	std	6.725	F	(N/R)
Specific Conductance (Field)	umhos/cm	550	F	(N/R)
Temperature (Field)	Deg. C	9.8	F	(N/R)
Redox Potential (Field)	mv	133	F	(N/R)
Total Organic Carbon (TOC)	mg/l	4.062	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	14.0	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	360	A	(10)
Ammonia as N	mg/l	3.6	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	6.7	U	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A *Quantitative Data*
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Monitoring Well: OW-60

Chemical Parameter		04/18/91		
pH (Field)	std	5.72	F	(N/R)
Specific Conductance (Field)	umhos/cm	2700	F	(N/R)
Temperature (Field)	Deg. C	9.6	F	(N/R)
Redox Potential (Field)	mv	75	F	(N/R)
Total Organic Carbon (TOC)	mg/l	21.385	J	(1.0)
Chemical Oxygen Demand (COD	mg/l	86.3	J	(10.0)
Total Dissolved Solids (TDS)	mg/l	1800	J	(10)
Ammonia as N	mg/l	33	J	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l	34	J	(0.2)

Explanation
- N/R Not Reported
- – Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

Table 5

Summary of Ground-Water Quality Data, Arsenic Pit/Chromium Lagoon
Ground-Water Investigation, Industri-Plex Site, Woburn, Massachusetts.

Chemical Compound Class: General Water Quality Parameters

Chemical Parameter		Monitoring Well: OW-50A					
		04/16/91			04/18/91		
pH (Field)	std	6.12	F	(N/R)	5.85	F	(N/R)
Specific Conductance (Field)	umhos/cm	755	F	(N/R)	1200	F	(N/R)
Temperature (Field)	Deg. C	13.7	F	(N/R)	9.5	F	(N/R)
Redox Potential (Field)	mv	243	F	(N/R)	151	F	(N/R)
Total Organic Carbon (TOC)	mg/l		-		8.962	J	(1.0)
Chemical Oxygen Demand (COD	mg/l		-		24.7	J	(10.0)
Total Dissolved Solids (TDS)	mg/l		-		490	A	(10)
Ammonia as N	mg/l		-		17	U	(0.2)
Nitrogen, Total Kjeldahl (TKN)	mg/l		-		18	U	(0.2)

Explanation
- N/R Not Reported
- - Not Analyzed
- Validation Codes
  - A Quantitative Data
  - J Qualitative Data
  - R Unusable Data
  - U Chemical Parameter Not Detected
  - UJ Chemical Parameter Not Detected, Detection Level Estimated
  - F Field Data

LEGEND

- SITE BOUNDARY
- N 553,000 — GRID LINE
- SOIL PILES
- STREAMS AND WATERCOURSES
- RAILROAD TRACKS
- OW-46 — NEWLY INSTALLED MONITORING WELL (LOCATION SURVEYED) SAMPLED IN APRIL, 1991
- OW-38 — EXISTING MONITORING WELL (LOCATION SURVEYED) SAMPLED IN APRIL, 1991
- OW-15 — EXISTING MONITORING WELL (LOCATION UNSURVEYED) SAMPLED IN APRIL, 1991
- OW-10 — MONITORING WELL (LOCATION SURVEYED) NOT SAMPLED IN APRIL, 1991
- OW-14 — MONITORING WELL (LOCATION UNSURVEYED) NOT SAMPLED IN APRIL, 1991
- HIDE PILES BASED ON CONSENT DECREE
- A/2 — DETAIL/CROSS SECTION DESIGNATION; SHT. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTES

1.) TOPOGRAPHY FROM PHOTOGRAMMETRIC MAP COMPILED BY LIU AERIAL SURVEYS 15 APRIL 90, FOR SAIC ENGINEERING, INC. AT 1 IN. TO 100 FT. AERIAL PHOTOS TAKEN 22 NOVEMBER 89, SCALE 1 IN. TO 800 FT.

2.) SITE BOUNDARY SURVEY BY SAIC ENGINEERING, INC. APRIL, 1990 AND JANUARY, 1991.

3.) ELEVATIONS TO NATIONAL GEODETIC VERTICAL DATUM OF 1929. GRID COORDINATES BASED ON MASSACHUSETTS COORDINATE SYSTEM.

4.) TOPOGRAPHIC CONTOUR INTERVAL 2 FEET.

AUG 0 2 1991

REV	DATE	DESCRIPTION	DR BY	RVW BY

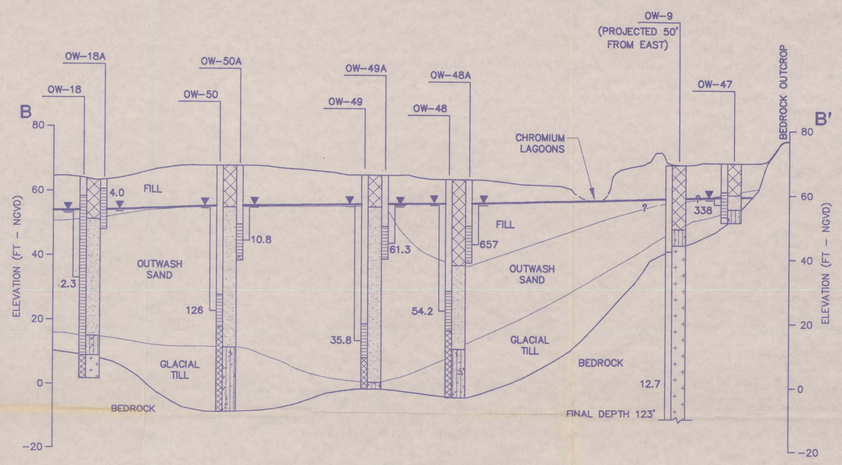
SCALE: AS SHOWN		PROJECT: INDUSTRI-PLEX SITE REMEDIAL TRUST WOBURN, MASSACHUSETTS
PROJECT No. 893-6255		
DES BY	DSL	07/12/91
DR BY	RDH	07/26/91
CHK BY	[illegible]	[illegible]
RVW BY	[illegible]	[illegible]

SHEET TITLE: MONITORING WELL LOCATION MAP

Golder Associates
Mt. Laurel, New Jersey

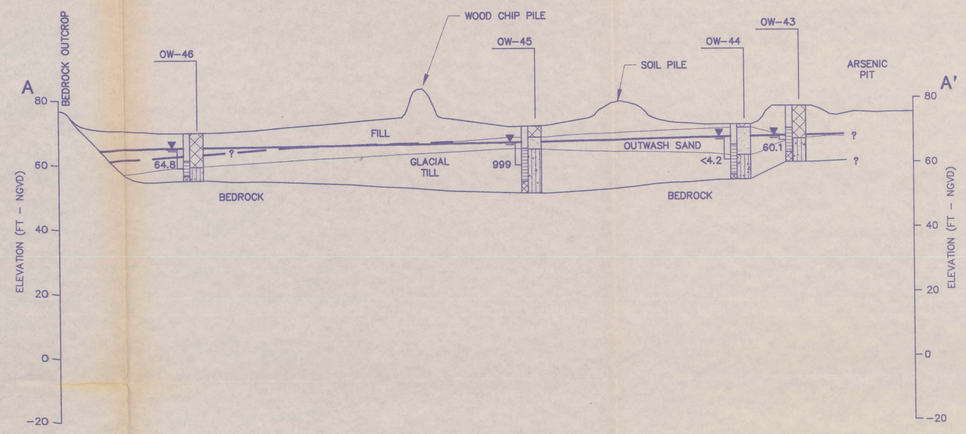
SHEET 1 OF 1
FILE No. MA01-714

FIGURE 1



CROSS SECTION B-B'
CHROMIUM LAGOON AREA - DISSOLVED ARSENIC

B / 2

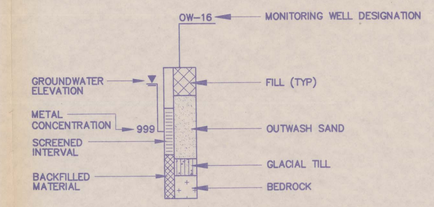


CROSS SECTION A-A'
ARSENIC PIT AREA - DISSOLVED ARSENIC

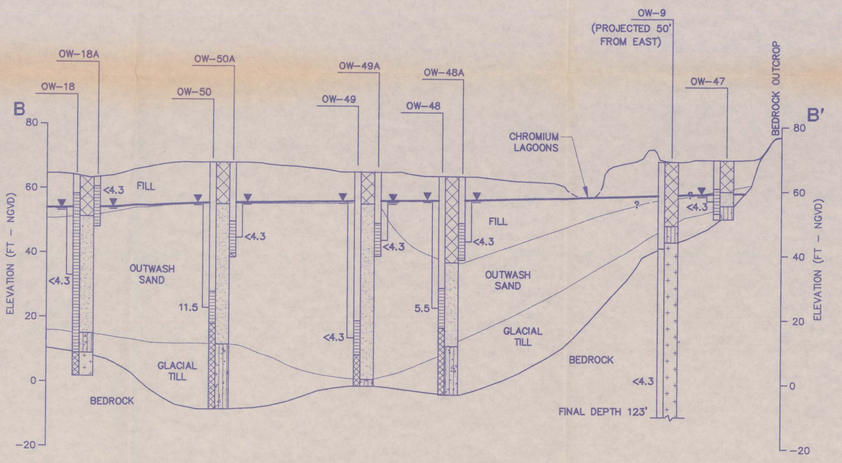
A / 2

LEGEND

A / 2 — DETAIL/CROSS SECTION DESIGNATION
SHEET No. WHERE DETAIL/CROSS SECTION IS PRESENTED

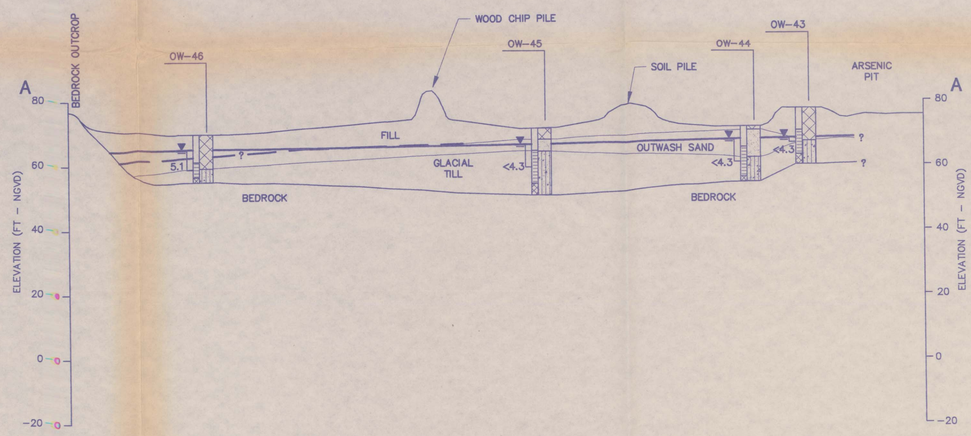


TYPICAL WELL DETAIL
NOT TO SCALE



CROSS SECTION B-B'
CHROMIUM LAGOON AREA - DISSOLVED CHROMIUM

B / 2



CROSS SECTION A-A'
ARSENIC PIT AREA - DISSOLVED CHROMIUM

A / 2

NOTES

1.) ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1929, AND COORDINATES BASED ON MASSACHUSETTS COORDINATE SYSTEM.

2.) GROUNDWATER MEASUREMENTS TAKEN ON 04/17/91 TO 04/19/91.

3.) OW-9 IS AN OPEN HOLE BEDROCK WELL. THE INTEGRITY OF THE CASING IS UNCERTAIN, THEREFORE THE WATER LEVEL ELEVATION HAS BEEN OMITTED.

100 0 100 200
horizontal scale feet

20 0 20 40
vertical scale feet

AUG 0 2 1991

REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE: AS SHOWN		PROJECT: INDUSTRI-PLEX SITE REMEDIAL TRUST WOBURN, MASSACHUSETTS
PROJECT No. 893-6255		
DES BY	DSL	07/25/91
DR BY	RDH	08/02/91
CHK BY	RMG	08/2/91
RVW BY	JCR	08/02/91

SHEET TITLE: CROSS SECTIONS

Golder Associates
Mt. Laurel, New Jersey

SHEET 1 OF 1
FILE No. MA01-741

FIGURE 2

APPENDIX A

Technical Procedures

1.0 PURPOSE

This technical procedure is to be used for installing single monitor wells in an unconsolidated deposit. This procedure assumes the borehole is stable or has been stabilized (kept open) with either auger flights or drive casing.

2.0 APPLICABILITY

This technical procedure is applicable to all Golder Associates Inc. personnel involved with installation of monitor wells.

3.0 DEFINITIONS

3.1 Monitor Well: A well completed within a zone of interest and of sufficient diameter to allow sampling and pump testing.

3.2 Bentonite: An expanding clay.

3.3 Drive Casing: A pipe used to line a borehole to prohibit caving and/or prevent direct flow from the formation into the borehole. Hollow stem augers may be considered as analogous in function to drive casing for the purposes of this technical procedure.

3.4 Grout: A cement mixture, originally fluid enough to flow through tremie pipes, used to seal casing within a borehole.

3.5 Well Screen: A wire-wrapped or slotted pipe which allows flow of water from the formation into the well

3.6 Monitoring Interval: The only zone in which groundwater can enter the well.

4.0 REFERENCES

4.1 Gibson, U.P. & Singer, R.D., 1971, Water Well Manual, Premier Press, California.

4.2 Anderson, K.E., 1979, Water Well Handbook, Missouri Water Well & Pump Contractors Assn., Inc. Missouri.

5.0 RESPONSIBILITY

5.1 Field Engineer: Field Engineers are responsible for well installation in compliance with this procedure.

5.2 Task Leader: Task Leaders shall be responsible for:

- Direct supervision of personnel drilling boreholes and making well completions;
- Assurance that equipment and material are available to permit accomplishment of the task;
- Review and approval of daily work reports; and
- The completion of drilling operations and well installation to the satisfaction of Golder Associates' standards of operation, and the client's requirements, and the requirements of any concerned regulatory agencies.

5.3 Project Manager: The Project Manager shall be responsible for:

- Selecting location of boreholes at the site and determining depth and details of completion of monitor wells;
- Selection and contracting of services of drilling subcontractors;
- Scheduling; and
- Providing guidelines or specific work instructions for technical requirements beyond the scope of the applicable technical procedure.

6.0 EQUIPMENT AND MATERIALS

- A drill rig of suitable design with all accessories, including a motor, compressor, rigging, and water pump;
- Steam cleaner for cleaning drilling equipment between holes with associated wash/rinse solution storage tanks, brushes and contaminated solution capture equipment;
- Hole stabilization equipment;

- Ancillary equipment for drilling, including water truck and drive casing. Chemical characteristics (particularly of analytes of concern) need to be known for the water to be used down-hole;
- High silica pea gravel or coarse sand (no carborate content) whichever is more appropriate for the formation materials;
- Steel protective surface casing 8-inch diameter and 4-inch diameter, 8 foot long with at least 0.25 inch wall thickness. A lockable steel cap and locks that fit the 8 inch diameter casing are required;
- Pure bentonite powder, compressed bentonite pellets, "Volclay", and/or "Pure Gold";
- Pure bentonite slurry (approximately 2 lb. bentonite to 1 gal. of water) or "Volclay"/"Pure Gold" slurry (according to manufacturer's instructions);
- Grout pump/mixer and tremie line;
- Concrete (Portland Type I and II cement; water added at a ratio of 6 gallons per 94 lb sack);
- Volclay grout powder; water shall be added at the ratio of 23 gallons per 48 lb. sack of Volclay or Pure Gold grout with 2 lbs of initiator (hardener);
- Flush threaded well casing and end plug, preferably factory cleaned and sealed;
- Flush threaded well screen with factory slotted with appropriate slot size. Should be factory cleaned and sealed;
- History of Hole forms (Exhibit A);
- Clipboard;
- Indelible ink pens and felt tip markers;
- Folding rule and tape measure;
- Depth sounder;
- Monitoring Well Installation Logs (Exhibit B);
- Well centralizers, if appropriate, for formation and completion materials;
- Turbidity meter; and

- Organic vapor analyzer (OVA) or monitor (OVM), if required due to site hazard.

7.0 PROCEDURE

7.1 Well Installation

The Project Manager shall decide on the total depth of a completed borehole. When the borehole has been drilled, sampled and stabilized to a total depth according to procedures in TP-1.2-5, the Project Manager shall decide the depth interval for monitoring. This procedure assumes that the borehole is stabilized with either drive casing or auger flights. All drill rods and drill bits must be removed from the borehole.

A single monitoring well shall be installed within the borehole. Figure 1 illustrates the construction details of a completed monitoring well (the diagram is not to scale). Wells shall be completed as follows:

- The only portion of the completed well with well screens and a sand or gravel pack should be adjacent to the particular aquifer zone to be monitored.

- All other sections, except within 5 feet of land surface, shall be sealed with a bentonite-type slurry that shall be tremie pipe pumped through to the appropriate locations or with bentonite pellets that shall be compacted in place.

- The upper most 5 to 8 feet of the borehole annulus shall be filled with a cement grout for a surface seal and stability in freezing weather for protective surface monuments.

The Golder Field Engineer shall document all significant drilling events during the installation of each monitoring well each day on a History of Hole (Exhibit A) forms. The documentation shall include the time that the events occurred. Particular emphasis shall be placed on documenting the production hours and hours delayed in production with explanations. Notes on the weather conditions and drilling personnel shall also be recorded on the History of Hole form. During completion all backfilled materials and depths of well screens shall be sounded with a measuring tape with attached weight on the sounding end. Well completion details shall be recorded on the Monitoring Well Installation Log (Exhibit B) by the Field Engineer.

If the desired monitored interval is above the bottom of the borehole, the borehole must be backfilled with a low permeability Volclay grout with the manufacturer's initiator. The Volclay grout shall be tremie pipe pumped to the bottom of the borehole to about seven feet within the inside of the stabilizing steel casing or auger. The auger or steel casing shall be pulled or hammered out of the hole five feet. This procedure should be repeated until the bottom of the drive casing and top of the Volclay grout are equivalent to the bottom elevation of the desired monitoring interval. The Volclay grout should be allowed to set prior to placing the gravel/sand pack and well casing/screen to establish a solid foundation.If the Volclay does not harden adequately to permit a firm foundation for supporting the well, then a cement/bentonite grout should be used and allowed to harden.

Volclay and/or cement grout should never be allowed to harden while the drive casing is in contact.

Before placing the well and screen the bottom of the monitored interval shall have one foot of gravel/sand pack. The screen and well casing shall be assembled while lowering. Care must be taken not to lose the well/screen down the borehole. If appropriate for the formation and completion materials, a well centralizer (correct size should be the width of the smallest diameter drive casing in which the well shall be installed) shall be placed on the bottom of the well screen and at a minimum of 40 feet intervals on the well casing. Augers with four inch inside diameter hollow stems do not need well centralizers. The tremie pipe must also be assembled and lowered simultaneously with the well casing and screen to avoid problems with the centralizers. Gravel/sand should be tremie piped, if possible, or poured down the annulus between the well and the drive casing. The gravel/sand pack shall be placed to a level no greater than one foot within the bottom of the drive casing. The drive casing shall be pulled up 1/2 foot and the position of the well casing and sand pack should be sounded. This process shall be repeated until the sand pack is three feet above the top of the well screen. The reason for raising the drive casing 1/2 foot at a time and for allowing one foot of sand pack inside the casing is to minimize the risk of sand locking the well screen with the drive casing.

Once the gravel/sand pack and well screen are in place, a bentonite pellet plug (minimum of 2 foot column) may be placed on top of the pack for sealing. The bentonite pellets are optional below the water table because the risk of the pellets could expand and lock the well casing to the drive casing. Any pellets added should not be allowed to settle within the bottom of the drive casing. This may be

difficult to impossible if the formation collapses immediately when the drive casing is pulled-up.

The remainder of the borehole annulus to within five to eight feet of land surface shall be filled with Volclay grout with the manufacturer's initiator. The sealant mixture shall be pumped into place with a tremie pipe. The interval of filling and pulling back casing should be the same as described in 8.1.5. Volclay grout shall never be allowed to harden while the drive casing is in contact. If the drive casing is being pulled-up easily and the encountered formation materials should not pose a problem pulling the casing, the repeat interval may be increased by approval of the Task Leader, but shall not be greater than 20 foot.

The borehole annulus from the surface to five (5) to eight (8) foot depth shall be cemented with a concrete mixture that is stable during freezing. This mixture can be poured from the surface. A six or eight inch diameter (0.25 inch wall thickness) protective steel surface casing shall be placed within the concrete to a depth of five feet and centered around the well casing. The top of the protective steel casing shall be more than one inch but less than six inches above the top of the well casing. The steel casing should extend about three feet above land surface. Gravel/sand shall be placed in the annulus between steel casings and the well casing and the steel casing. A hole shall be drilled near the bottom of the sand pack within the protective steel casings (just above the concrete) for draining any accumulated water. Around the outside of the protective steel casing and on the surface of the ground a sloped concrete pad shall be constructed to prevent surface water infiltration. A lockable cap shall be established on the protective steel casing that prevents precipitation from entering.

7.2 Well Development

The well shall need to be developed to remove soil/cutting within the well casing and improve hydraulic communication between the well screen and the monitored interval. Developing involves purging the well with a sand bailer/plunger to create a "in and out" motion of the water through the well and gravel/sand pack or sustained pumping at a high flow rate. The sand bailer shall remove gross amounts of sand and silt from the well. The fine suspended particles can be removed by air lifting water out of the well with the use of a compressor and tremie-pipe. Any air introduced from a compressor must be filtered to remove entrained oils. This process of surging and air lifting shall be repeated until the turbidity of the water is low to the satisfaction of the Task Leader or Field Engineer.

The purged water during well development must be captured. The water shall be tested for the presence of targeted contaminants. If targeted contaminants are not detectable, the water can be discharged to the most convenient locations. If targeted contaminants are detected, then the disposition of the contained fluids shall be as directed by the client.

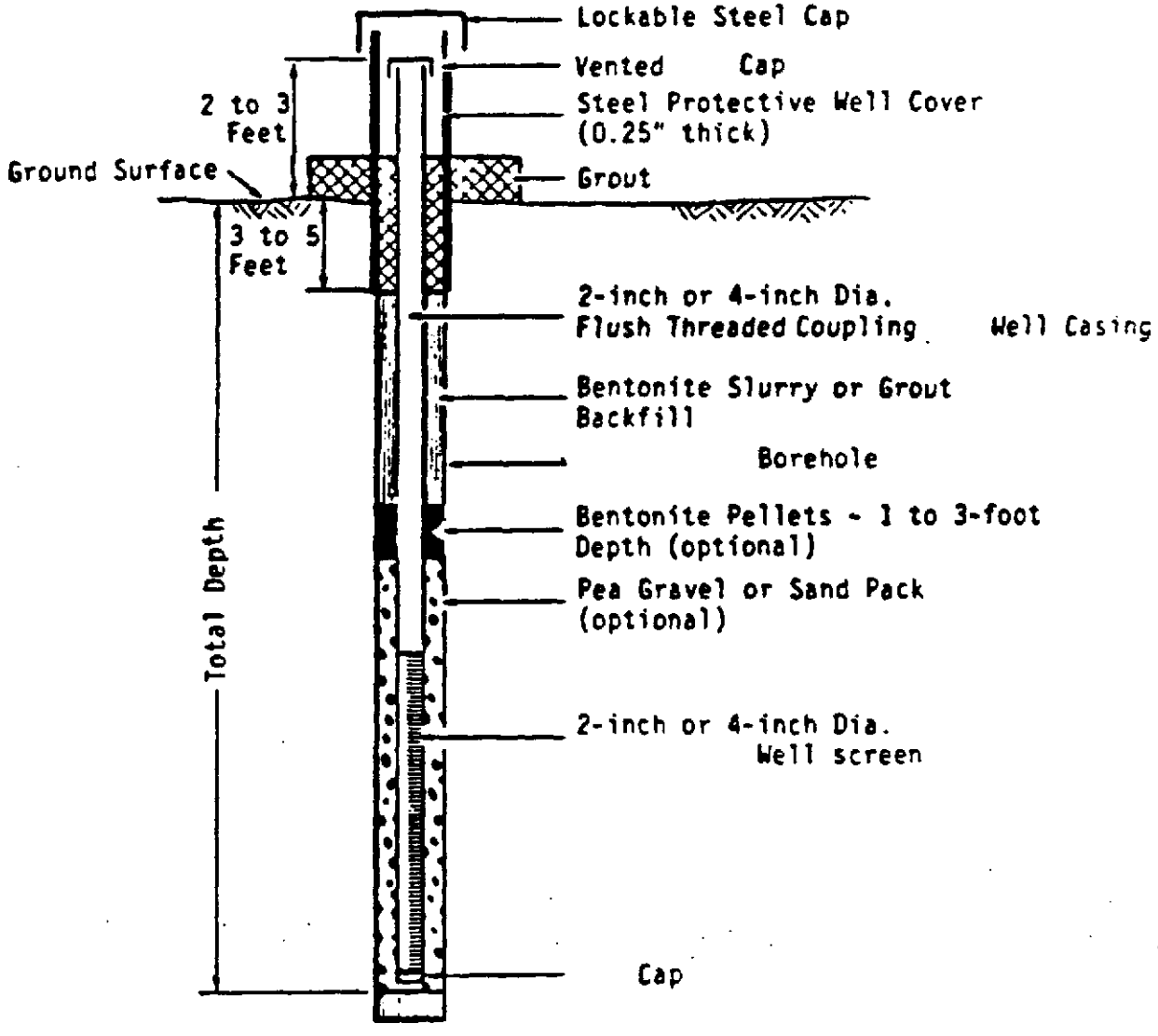
7.3 Precautions

All water used for mixing cement/grout/Volclay or used down hole must be chemically characterized, particularly for the analytes of concern for the site. The Task Leader must approve the water source before use. All bentonite and cement must be pure. Additives either contained in these materials or to be added to the mixture must be approved in writing by the Golder Project Manager. All well screens and well casings must be steam cleaned on site prior to installation and should be handled with clean gloves. The casing should not be allowed to touch the ground while installing otherwise a rinse with organic free distilled/deionized water shall be used for rinsing prior to installation. All down hole drilling equipment must be decontaminated and cleaned prior to use for other boreholes or demobilized from the site. The decontamination includes steam cleaning. All wash solution shall be captured and tested prior to disposal. The disposal of fluids shall be as directed by the client.

7.4 Documentation

History of Hole sheets shall be prepared by the Field Engineer to record daily drilling activities and events. The Monitoring Well Installation Log shall be used to record the construction details of the monitoring well installation by the Field Engineer. Both the History of Hole and Monitoring Well Installation Log are considered field records for installing monitoring wells. Field records shall be made in triplicate at the work site and originals transmitted to the home office after completion of each well. A copy shall be given to the Task Leader and the Field Engineer retains the other copy for reference.

All copies of field records shall be hand delivered to the home office upon completion of the field activities.



Note: Not to Scale

FIGURE 1

GENERALIZED SCHEMATIC DIAGRAM OF COMPLETED SINGLE WELL CONSTRUCTIONS

Golder Associates

HISTORY OF HOLE

Job # _____

Sheet ____ of ____

Geologist _____ Date _____ Boring # _____

Driller _____ Surface Elevation _____ Weather _____ Temperature _____ °F

Contractor _____ Drill Fluid _____ Depth _____ to _____

Location _____ Type of Barrel _____ Casing Size _____ Core Size _____

BEGINNING OF SHIFT	END OF SHIFT
Time _____ Depth of Hole _____	Time _____ Hrs. Productive _____ Hrs. Delayed _____
Depth to WL _____ Depth to Casing _____	Depth of Hole _____ Depth of Casing _____ Depth to WL _____

"TP-1.2-12"
EXHIBIT B

MONITORING WELL INSTALLATION LOG

JOB NO. _____ PROJECT _____ WELL NO _____ SHEET _____ OF _____

SA REP. _____ DRILLING METHOD _____ GROUND ELEV _____ WATER DEPTH _____

WEATHER _____ DRILLING COMPANY _____ COLLAR ELEV _____ DATE/TIME _____

TEMP _____ DRILL RIG _____ DRILLER _____ STARTED _____ TIME / DATE COMPLETED _____ TIME / DATE

MATERIALS INVENTORY

WELL CASING _____ O.D. _____ ft WELL SCREEN _____ O.D. _____ ft BENTONITE SEAL _____

CASING TYPE _____ SCREEN TYPE _____ INSTALLATION METHOD _____

JOINT TYPE _____ SLOT SIZE _____ FILTER PACK QTY _____

GROUT QUANTITY _____ CENTRALIZERS _____ FILTER PACK TYPE _____

GROUT TYPE _____ DRILLING MUD TYPE _____ INSTALLATION METHOD _____

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	GROUND SURFACE		
0.0			

WELL DEVELOPMENT NOTES

1.0 PURPOSE

This technical procedure is to be used to establish a uniform procedure for installing monitor wells using hollow stem augering techniques.

2.0 APPLICABILITY

This technical procedure is applicable to all Golder personnel responsible for installation of monitor wells using hollow stem augering techniques.

3.0 DEFINITIONS

3.1 Monitoring Well. A well completed within a zone of interest and of sufficient diameter to allow sampling and pump testing.

3.2 Bentonite. An expanding clay.

3.3 Well Casing. A pipe used to line a borehole to prohibit caving and/or prevent direct flow from the formation into the borehole.

3.4 Grout. A cement mixture which is originally fluid enough to flow through tremied pipes. It is used to seal casing within a borehole.

3.5 Well Screen. A perforated or slotted pipe which allows flow of water from the formation into the borehole.

4.0 REFERENCES

4.1 Gibson, U.P. & Singer, R.D., 1971, Water Well Manual, Premier Press, California.

4.2 Anderson, K.E., 1979, Water Well Handbook, Missouri Water Well & Pump Contractors Assn., Inc., Missouri.

5.0 RESPONSIBILITY

5.1 Each Field Engineer installing monitor wells shall be responsible for compliance with this technical procedure.

5.2 Each Task Leader shall be responsible for:

- Selection of borehole locations at the site and determining depth and details of completion of monitor wells;
- Direct supervision of personnel drilling boreholes and making well completions;
- Assurance that equipment and material are available to permit accomplishment of the task;
- Selection and contracting of services of drilling subcontractors;
- Scheduling;
- Providing guidelines or specific work instructions for technical requirements beyond the scope of the applicable technical procedure,;
- Review and approval of daily work reports; and
- The completion of drilling operations, and well installation to the satisfaction of the Client, and other regulatory bodies as applicable.

6.0 EQUIPMENT AND MATERIALS

- A hollow stem drill rig of suitable design with all accessories, including a motor, rigging, and water pump to provide optimum penetration of in-situ materials;
- Steam cleaner, cleaning brushes and cleaning solutions for cleaning drilling equipment between holes;
- Hole stabilization equipment;
- Generally required drilling accessory equipment, including water truck and casing;
- Pea gravel or coarse sand;
- Bentonite powder and/or Bentonite compressed pellets;
- Bentonite slurry (approximately 2 lb. bentonite to 1 gal. of water) mixing equipment;
- Grout pump/mixer;

- Grout (pure bentonite or 4-5% bentonite in Portland cement, as required);
- 2-inch or 4-inch nominal inside diameter casing;
- Well screen (2-inch or 4-inch, flush threaded). Slot size should be appropriate for soil conditions at the monitored interval;
- History of Hole forms;
- Clipboard;
- Field Borehole Logs and Field Well Completion forms;
- Folding rule;
- Depth Sounder; and
- Teflon tape, if necessary.

7.0 PROCEDURE

Drilling will proceed with a "hollow-stem augering" method. The first section of the auger flights shall be equipped with a drill-bit. All drilling equipment will be steam cleaned between boreholes.

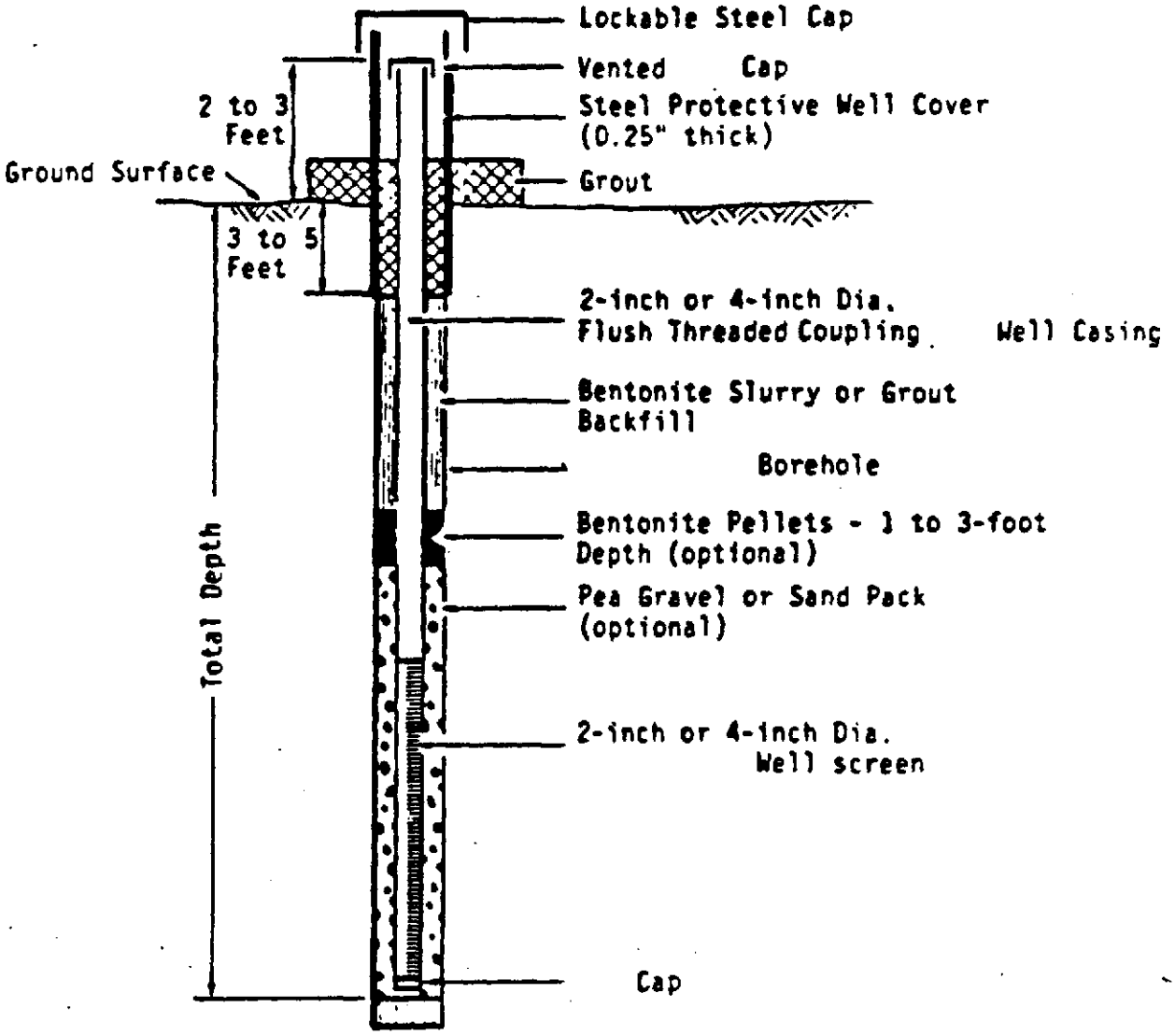
Relevant events shall be documented on the History of Hole Form (Exhibit A). The Field Engineer will sample drill cuttings and make recordings of penetrated materials on the Field Borehole Log (Exhibit B). After intercepting the water table, the Field Engineer will estimate and record the depth of the water table.

During drilling or well installation, fluids and/or additives to either assist in cuttings removal or for borehole stability shall not be used. Before any fluid and/or additives are used, written approval must be obtained from the Task Leader.

Hole locations may be changed as a result of initial findings. When the hole has been drilled to the total depth, the wells will be constructed as shown in Figure 1. No glues or solvent shall be used on the well casing or screens. Teflon tape shall be used on threaded couplings only if recommended by manufacturer. All steel will be removed from the borehole that is adjacent to well screens.

When the well is completed, the only section (interval) of the completed well which has well screens and a sand and gravel pack will be adjacent to the particular aquifer zone to be monitored. All other sections will be sealed with a bentonite grout or slurry that will be tremie pipe pumped through to the appropriate locations or with bentonite pellets that will be compacted in place. The uppermost 3 to 5 feet of the borehole annulus will be filled with a cement grout. During completion, all backfilled materials and depths of well screens will be sounded with a measuring tape with attached weight on the sounding end. The final construction details will be recorded on the Field Well Completion Log.

The hole will be developed to enhance communication with the formation. The Field Engineer shall determine when adequate well development has been achieved. An adequately developed well should not have a clogged screen and yield relatively turbid free groundwater that is representative of the natural turbidity at the formation. If the development water is contaminated, then the water shall be captured and disposed of in compliance with the client's directions or the requirements of the QA project plan.



Note: Not to Scale

FIGURE 1

GENERALIZED SCHEMATIC DIAGRAM OF COMPLETED SINGLE WELL CONSTRUCTIONS

Golder Associates

HISTORY OF HOLE

Job # _____ Sheet ____ of ____

ologist _____ Date _____ Boring # _____

Driller _____ Surface Elevation _____ Weather _____ Temperature _____ °F

Contractor _____ Drill Fluid _____ Depth _____ to _____

Location _____ Type of Barrel _____ Casing Size _____ Core Size _____

BEGINNING OF SHIFT	END OF SHIFT
Time _____ Depth of Hole _____	Time _____ Hrs. Productive _____ Hrs. Delayed _____
Depth to WL _____ Depth to Casing _____	Depth of Hole _____ Depth of Casing _____ Depth to WL _____

Checked by:

"TP-1.2-12"
EXHIBIT B

MONITORING WELL INSTALLATION LOG

JOB NO. _____ PROJECT _____ WELL NO _____ SHEET _____ OF _____

DA WSP _____ DRILLING METHOD _____ GROUND ELEV _____ WATER DEPTH _____

WEATHER _____ DRILLING COMPANY _____ COLLAR ELEV _____ DATE/TIME _____

TEMP _____ DRILL RIG _____ DRILLER _____ STARTED _____ (Hrs / Date) COMPLETED _____ (Hrs / Date)

MATERIALS INVENTORY

WELL CASING _____ D. dia _____ LF	WELL SCREEN _____ D. dia. _____ LF	BENTONITE SEAL _____
CASING TYPE _____	SCREEN TYPE _____	INSTALLATION DEPTHS _____
JOINT TYPE _____	SLOT SIZE _____	FILTER PACK QTY _____
GROUT QUANTITY _____	CENTRALIZERS _____	FILTER PACK TYPE _____
GROUT TYPE _____	DRILLING MUD TYPE _____	INSTALLATION METHOD _____

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	ground surface		
0.0			

WELL DEVELOPMENT NOTES

1.0 PURPOSE

1.1 This technical procedure is to be used to establish a uniform procedure for measuring water levels in drill holes and piezometers.

2.0 APPLICABILITY

2.1 This technical procedure is applicable to all personnel measuring water levels.

3.0 DEFINITIONS

3.1 Electric Water Level Sounder (EWS). An instrument for measuring water levels in boreholes. An EWS is essentially an open circuit involving an ammeter and battery mounted on a reel on which insulated two-wire electric cord (calibrated by length) is wound. The circuit is closed when the exposed ends of the two wires are immersed in water. Current flow is registered on a meter on the reel.

4.0 REFERENCES

4.1 Cooley, R.L., et al, 1972, Hydrologic Engineering Methods for Water Resource Development, Vol. 10-Principles of Groundwater Hydrology, Section 6.01, U.S. Army Corps of Engineers (HEC-IHD-1000)

5.0 DISCUSSION

5.1 None

6.0 RESPONSIBILITY

6.1 Field Engineer/Geologist: Responsible for measurement in compliance with this technical procedure.

6.2 Task Leader: Responsible for:

- Direct supervision of personnel taking the measurements
- Assurance that equipment and material are available to permit accomplishment of the task

7.0 EQUIPMENT AND MATERIAL

7.1 Electric water-level sounder or measuring tape with a wettable surface.

7.2 Folding rule.

7.3 Field notebook or appropriate Water Level Reading forms (Exhibit A).

7.4 Data on well identification number and locations.

7.5 Spare battery for electric water-level meter.

7.6 Indelible ink pens

8.0 PROCEDURE

8.1 Record well identification number and measuring device type and serial number.

8.2 Each water level sounder or measuring tape used for recording water levels shall have the depth graduations checked with an independent folding rule or measuring tape for calibration prior to field use.

8.3 Clean all downhole instruments and equipment before and after measurements between wells. Cleaning shall be with a non-phosphate detergent rinse followed by a rinse with approved tap water, then rinse with organic free distilled/deionized water.

8.4 Measure and record distance from ground level to top of casing or standpipe. Measure the vertical distance from the top of casing or standpipe to the point of the elevation survey mark (if different from top of casing or standpipe).

8.5 If an EWS is used, turn on the EWS, check the battery, lower the wire into the borehole or standpipe and stop at the depth where the EWS meter indicates a completed circuit. Record the length of the wire below the casing collar or top of the standpipe to the nearest 0.01 foot.

8.6 If a measuring tape is used, lower the tape (with a weight attached) into the borehole. The tape must be lowered a sufficient depth into the well to ensure the wettable surface section of the tape is partially submerged. The total length of the tape within the well (from the top of casing or standpipe) and the length of the wetted surface to the submerged end of the tape shall be recorded.

8.7 Record date, time, well designation, measuring device and all measurements on a Water Level Readings Form (Exhibit A) in triplicate. The personnel making the measurement shall initial or sign each measurement recorded. All water level measurement records shall be maintained in the project records files.

RECORD OF WATER LEVEL READINGS

Job. No. ______________ Project Name ____________________ Location ______________

Bore-Hole No.	Date	Time	Measuring Device/ Serial No.	Measurement Point (M.P.)	Water Level below M.P.	Correction to Survey Mark	Survey Mark Elevation	Water Level Elevation	By	Comments

STANDARD OPERATING PROCEDURE
FOR SAMPLING GROUND-WATER MONITORING WELLS

1.0 MATERIALS AND EQUIPMENT

1.1 The following items may be required for monitoring well sampling and data collection:

a. Appropriate bailer(s) for test substances.
b. Non-absorbent cord (e.g., polypropylene).
c. Pre-measured plastic bucket(s).
d. Plastic sheets.
e. m-scope
f. Tape measure (steel - tenth of a foot measurement increments) and chalk.
g. Pen knife.
h. Field forms/Field notebook.
i. Well location map.
j. Cleaning agents (detergent, distilled or deionized water, potable water).
k. Pump (if purging required) and associated materials such as:

   1. Teflon tape.
   2. Appropriate tubing (e.g., polyethylene) if using peristaltic pump.
   3. Portable generator if using submersible pump.

l. Water Well Handbook.
m. Calculator.
n. Hard hat (if required on location).
o. pH meter.
p. Conductivity meter.
q. Thermometer.
r. Paper towels, clean rags.
s. Black pen and pencil.
t. Wet ice and/or blue packs.
u. Sample jars, codes, and labels.
v. Electrical tape.
w. Pipe wrench.
x. Screwdriver, hammer.
y. Cooler(s).
z. Water jugs.
aa. Disposable gloves
bb. Well keys.
cc. Masking and packing tape.
dd. Water-proof marker.
ee. Well sampling form(s).
ff. Non-phosphate, laboratory-grade detergent.
gg. Distilled/deionized water.
hh. Chain-of-custody form(s).
ii. Custody seal(s).
jj. Extra batteries (meters, thermometer).
kk. Buffer/calibration solutions.

2.0 PROCEDURE

2.1 Once the wells are in place, and properly developed, ground-water samples will be taken for water-quality analyses.

2.2 Make sure all equipment is decontaminated, cleaned, and calibrated before use and document daily activities in the field notebook.

2.3 Document well identification and pre-sampling information in the field notebook as needed.

2.4 Inspect the protective casing of the well and note any items of concern such as a missing lock or bent casing. Complete the Well Inspection Checklist.

2.5 Place plastic sheeting around the well to protect sampling equipment from potential contamination.

2.6 Remove the well cap or plug and clean the top of the well off with a clean rag. Place the cap or plug on plastic.

2.7 Measure the depth to water using an electronic probe (m-scope) or steel tape and chalk. Document in the field notebook.

2.8 Measure the depth of the well with the steel tape or obtain from construction diagram. Calculate and record the volume of water in the well in the field notebook.

2.9 Prior to sampling, the well should be pumped or bailed to remove a minimum of three casing volumes if the recharge rate is adequate to accomplish this within a reasonable amount of time. The well should not be pumped or bailed dry. If the well produces little water, at least one well volume must be purged. The well will be sampled after the water level has stabilized.

2.10 Record the temperature, pH, conductivity, and physical appearance of the water in the field notebook (e.g., color, turbidity, odor, etc.) as it is pumped or bailed, a minimum of three times.

2.11 If the bailer has not been decontaminated, decontaminate it according to the procedures described previously. If the bailer has been decontaminated, flush it several times with distilled/deionized water, and collect and discard (in an appropriate manner) three bails of well water before collecting the sample.

2.12 Using a non-absorbent cord (e.g., polypropylene), lower the bailer into the well.

2.13 Quality-control samples will be used to monitor sampling and laboratory performance and will include replicates, and blanks, spikes.

a. Replicate analysis is done to check on samples reproducibility. The procedure to be used for taking replicate samples follows. If samples are

collected for volatile organic compound (VOC) analysis, then the water from the bailer will be distributed first to fill one VOC container and then to fill the second VOC container. Adequate water will be available to fill both of the bottles completely before they are capped. A replicate sample will be collected every 20 samples at a minimum.

b. Trip blank analysis is performed to detect if contamination has occurred during field handling, shipment, or in the laboratory. A trip blank is a container that is filled with distilled/deionized water in the laboratory, and travels unopened with the sample bottles. It is opened in the laboratory and analyzed along with the field samples for the constituent of interest.

c. Equipment blank analysis provides a check on sampling procedures. An equipment blank is made with distilled/deionized water by exposing it to the sampling processes (e.g., bailer). The clean water will be poured into the bailer (which has been decontaminated and is ready for sampling) and then into the sampling container. A field blank will be collected every 20 samples at a minimum.

d. A matrix spike, which is performed in the laboratory, is a check on the laboratory's ability to recover the matrix. Spikes of standard compounds may be added to samples in the laboratory to determine if the ground-water constituents are interfering with test substance identification or quantification. Such analyses may also point to systematic errors and lack of sensitivity of analytical equipment. A matrix spike and replicate matrix spike will be collected every 20 samples at a minimum.

2.14 Place samples in the pre-labeled containers and store on ice (wet ice or blue packs).

2.15 After sample collection is complete, measure and record the temperature, conductivity, pH, and physical appearance of the water, and record in the field notebook.

2.16 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cap.

2.17 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," and placed in its appropriate container (holder) in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the laboratory.

2.18 Complete the Chain-of-Custody forms. One copy of the Chain-of-Custody form is retained. Secure the cooler with sufficient packing tape and a Custody Seal. Forward the samples via overnight (express) mail or hand deliver to the designated laboratory preferably within 24 hours but no later than 48 hours after sampling. Notify the laboratory that samples have been shipped, and make special arrangements if Saturday delivery is necessary.

2.19 Decontaminate bailers, hoses, and pumps as discussed in the decontamination section. Wrap decontaminated equipment with a suitable material (e.g., aluminum foil). Discard the cord, rags, gloves, etc. in a manner consistent with the Health and Safety Plan.

STANDARD OPERATING PROCEDURE
FOR FILTRATION OF WATER SAMPLES FOR DISSOLVED METALS ANALYSES

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to describe the considerations and procedures for the field filtration of water samples for dissolved metals analyses prior to sample preservation. Filtering is implemented when the water sample originates from a medium-grained to fine-grained porous geologic formation that contains suspended fine-grained materials (fines) that cannot be prohibited from entering the water sample by well development or well design. Since fines are not always distinctly visible in a water sample, all water samples will undergo filtration.

It should be noted that filtration of water for metals analyses has been a standard practice with the United States Geological Survey (USGS) for many years. Within this framework, filtration refers to the filtering of water either directly or at the end of a filtration series through a 0.45 micrometer (micron) membrane filter (i.e., the presence of a large quantity of fines may require the prefiltering of the sample with a larger-size[s] membrane filter[s] prior to the 0.45 micron filter to avoid clogging the 0.45 micron filter using an exorbitant amount of time to filter).

Filtration will be done as soon as possible after a water sample is collected, preferably at the same time that the water is produced. The filtering equipment and membrane will be suitable for the intended analysis.

2.0 MATERIALS/EQUIPMENT

2.1 In order to field filter water samples, specific equipment and materials will be required. The equipment and materials needed for field filtering will include the following:

a. Non-phosphate, laboratory-grade detergent.
b. Distilled/Deionized water.
c. Potable water.
d. Roux Associates field forms (e.g., Daily Log, Sampling, etc.)/field book.
e. Filtration apparatus (e.g., Gelman apparatus, Buchner funnel, etc.), filters, pre-filters.
f. Plasticware (e.g., pre-measured buckets, beakers, flasks, funnels).
g. Teflon™ tape.
h. Vacuum pump (e.g., manual/hand-operated or electric).
i. Appropriate tubing.
j. Disposable gloves.
k. Sample jars with appropriate preservative (e.g., Nitric acid) and labels.

3.0 DECONTAMINATION

3.1 Decontamination procedures for filtering equipment follow:

a. Wear disposable gloves while cleaning filtering equipment to avoid contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and distilled or deionized water in a bucket.

c. Remove vacuum tubing from flask.

d. Remove filter membrane from funnel.

e. Disassemble filtering apparatus (flask and funnel) and scrub each piece of equipment with a brush and solution.

f. Rinse with potable water.

g. Rinse with copious amounts of distilled or deionized water.

h. Rinse with dilute, trace-metal analysis-grade Nitric Acid triple rinse with distilled water.

i. Air dry.

j. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

4.0 PROCEDURE

4.1 Ensure that the filtering equipment is properly decontaminated before use.

4.2 Assemble the filtering apparatus (funnel and flask), and connect the vacuum pump.

4.3 Place a clean (new) 0.45-micron pore-size filter in the funnel. Use larger, pore-size filters if prefiltering is required (i.e., if suspended sediment is present that would quickly clog the 0.45-micron filter and prevent continuous filtration).

4.4 Obtain the water sample using an appropriate, decontaminated sample-collection device (e.g., bailer, pump jar).

4.5 Pass the unpreserved water sample through the prefilter, if needed, and the 0.45-micron filter into the flask. Apply a vacuum using the vacuum pump, if needed, to facilitate filtering.

4.6 Transfer the filtered water sample to the appropriate, pre-labeled sample container containing the preservative (e.g., Nitric Acid) being careful not to overfill the container and dilute the preservative.

4.7 Follow standard operating procedures for sample documentation, shipping, and tracking (i.e., record keeping) as defined in the FSP and QAPjP.

4.8 Decontaminate the filtering equipment that came in contact with the water sample.

APPENDIX B

Soil Boring Logs

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-43

BORING DATE: 04/01/91

BORING LOCATION: N:553,983.40 E:696,106.80

SHEET: 1 OF 1

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ / WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
					74.60							
0	8"X12" HSA	0.0-2.0 ft. Compact, brown, c-f SAND, tr. silt (SP). <FILL>	SP		0.00 / 72.60	S-1	SS	7,5,4	9	67	■	
		2.0-5.5 ft. V. loose, white-orange purple silt (CL). <FILL>	CL		2.00 / 69.10							
5		5.5-10.0 ft. Loose brown-orange c-f SAND, tr. silt (SP). <FILL>	SP		5.50 / 64.60	S-2	SS	1,1,1	2	67	■	
10		10.0-17.0 ft. V. Dense, olive green grey c-f SAND, tr. silt, little - tr. gravel (SP). <GLACIAL TILL>	SP		10.00	S-3	SS	41,50,90	<100	67		■
15						S-4	SS	32,40,65	<100	67		■
		AUGER REFUSAL - BORING TERMINATED AT 17.00' BELOW GROUND SURFACE.			57.60 / 17.00							
20												
25												
30												
35												
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

Golder Associates

LOGGED: DSL

CHECKED: RMG

DATE: 04/01/91

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-44

BORING DATE: 04/11/91

BORING LOCATION: N:553,902.30 E:696,123.80

SHEET: 1 OF 1

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
0	6-5/8"X10" HSA	0.0-0.3 ft. Soft brown SILT, some c-f sand, some c-f gravel, rootmass (ML).	ML		69.30 / 0.00 / 0.30	S-1	SS	3,4,6	10	67	■	
		0.3-1.3 ft. Firm red-purple SILT, some f-sand, little c-f gravel (ML). <FILL>			1.30							
5		1.3-9.8 ft. Loose to compact c-f light brown SAND, trace silt (SP). <OUTWASH SAND>	SP			S-2	SS	2,2,3	5	100	■	
					59.50 / 9.80							
10		9.8-17.0 ft. Very Dense olive gray c-f SAND and c-f GRAVEL, trace silt (SP). <GLACIAL TILL>	SP			S-3	SS	30,40,28	68	100	■	
15						S-4	SS	17,40,50	90	100	■	
					52.30 / 17.00							
		AUGER REFUSAL - BORING TERMINATED AT 17.00' BELOW GROUND SURFACE.										
20												
25												
30												
35												
40												

DRILL RIG: B-53 ATV

DRILLING CONTRACTOR: D.L. Maher

DRILLER: J.A.G.

LOGGED: MRS

CHECKED: RMG

DATE: 04/11/91

Golder Associates

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-45

BORING DATE: 04/08/91

BORING LOCATION: N:563,581.50 E:696,162.50

SHEET: 1 OF 1

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					69.40							
0	6-5/8"x10" HSA	0.0-0.6 ft. Firm dk. brown SILT and SAND, little c-f gravel, root mass (SM).	SM		68.80 / 0.60	S-1	SS	8,18,16	34	53	■	
		0.6-3.9 ft. Construction waste: concrete, brick. <FILL>			65.50							
5		3.9-7.2 ft. Compact brown c-f SAND, some c-f gravel, little silt (SP-SM). <OUTWASH SAND>	SP-SM		3.90 / 62.20	S-2	SS	1,5,8	13	33	■	
		7.2-20.5 ft. Very dense c-f multi-compositional GRAVEL and c-f olive gray SAND, trace silt (GP). <GLACIAL TILL>	GP		7.20	S-3	SS	18,37,50	87	87		■
15						S-4	SS	8,37,50	87	73		■
20					48.90							
		AUGER REFUSAL - BORING TERMINATED AT 20.5' BELOW GROUND SURFACE.			20.50							
25												
30												
35												
40												

DRILL RIG: B-53 ATV

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JAG

Golder Associates

LOGGED: MRS

CHECKED: RMG

DATE: 05/01/91

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-46

BORING DATE: 03/26/91

BORING LOCATION: N:553,059.90 E:896,119.20

SHEET: 1 OF 1

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp O W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					68.20							
0	8"x12" HSA	0.0-2.5 ft. V. dense, pale brown, c-f SAND, little gravel, trace silt (SP). <FILL>	SP		0.00 / 65.70	S-1	SS	7,11,100	<100	33	■	
5		2.5-7.5 ft. Compact, pale brown-gray c-f SAND trace silt, (SP). <FILL>	SP		2.50 / 60.70	S-2	SS	7,11,8	19	66	■	
10		7.5-10.5 ft. Compact, dark purple f-m SAND and SILT (SM). <FILL>	SM		7.50 / 57.70	S-3	SS	5,10,14	24	66	■	
		10.5-12.5 ft. Compact, gray f-m SAND and SILT (SM). <GLACIAL TILL>	SM		10.50 / 55.70							
		12.5-15.0 ft. V. Dense, olive green-gray f-m SAND, little silt, some GRAVEL (SP). <GLACIAL TILL>	SP		12.50 / 53.20							
15		AUGER REFUSAL - BORING TERMINATED AT 14.50' BELOW GROUND SURFACE.			15.00	S-4	SS	38,95,100	<100	66	■	
20												
25												
30												
35												
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

LOGGED: DSL

CHECKED: RMG

DATE: 03/26/91

Golder Associates

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-47

BORING DATE: 03/18/91

BORING LOCATION: N:562,754.20 E:695,165.30

SHEET: 1 OF 1

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp ○ Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					67.80							
0	8"x12" HSA	0.0-0.6 ft. Loose brown c-f SAND, some silt, some f gravel, root mass, (SM). 0.6-1.4 ft. Dense gray c-f GRAVEL, some c-f sand, trace silt, cobbler present (GP). 1.4-2.5 ft. Purple c-f SAND, some silt (SM). 5.0-9.0 ft. Stiff white CLAY, (CH). <FILL>	SM		0.00	S-1	SS	3,23,10	33	53		
5						S-2	SS	12,33,27	60	100		
					58.80							
10		9.0-14.0 ft. Compact olive gray m-f SAND, little black silt, abundant muscovite flakes, (SP-SM). <OUTWASH SAND>	SM		9.00	S-3	SS	4,10,13	23	87		
					53.80							
15		14.0-18.0 ft. V. dense orange to olive gray SAND and GRAVEL, trace silt (SP). <GLACIAL TILL>	SP		14.00	S-4	SS	20,70,75	<100	100		
					49.80							
		AUGER REFUSAL - BORING TERMINATED AT 18.00' BELOW GROUND SURFACE.			18.00							
20												
25												
30												
35												
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

Golder Associates

LOGGED: MRS

CHECKED: RMG

DATE: 03/18/91

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-48

BORING DATE: 03/21/91

BORING LOCATION: N:552,337.60 E:696,264.50

SHEET: 1 OF 2

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT (Wp W Wl, 20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
0	8"x12" HSA	0.0-0.4 ft. Compact brown c-f SAND and GRAVEL, little silt, root mass (SP-SM).	SP-SM		63.00 / 0.00	S-1	SS	5,27,11	38	27	■	
		0.4-4.5 ft. Compact cobble and boulder fill. <FILL>			0.40							
5		4.5-26.5 ft. Loose brown to black c-f SAND, little c-f gravel, little silt; organics, wood, hides, burlap present (SP-SM). <FILL>			58.50 / 4.50	S-2	SS	7,4,3	7	77	■	
10						S-3	SS	5,3,2	5	33	■	
15			SP-SM			S-4	SS	1,3,3	6	13	■	
20						S-5	SS	6,4,4	8	40	■	
25						S-6	SS	6,4,3	7	20	■	
		26.5-52.5 ft. Loose to dense gray-beige c-f SAND, trace f. gravel, trace silt (SP). <OUTWASH SAND>			36.50 / 26.50							
30						S-7	SS	15,22,10	32	73	■	
35			SP			S-8	SS	4,3,6	9	53	■	
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

Golder Associates

LOGGED: MRS

CHECKED: RMG

DATE: 03/20/91

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-48

BORING DATE: 03/21/91

BORING LOCATION: N:552,337.60 E:696,264.50

SHEET: 2 OF 2

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT (Wp W Wl 20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					23.00							
40	8"x12" HSA	26.5-52.5 ft. Loose to dense gray-beige c-f SAND, trace f. gravel, trace silt (SP). <OUTWASH SAND>	SP		40.00	S-9	SS	6,22,15	37	40	■	
45						S-10	SS	2,2,4	6	40	■	
50						S-11	SS	4,4,12	16	53	■	
					10.50							
		52.5-64.0 ft. Dense to very dense olive gray SAND, some gravel, trace silt (SP). <GLACIAL TILL>			52.50							
55						S-12	SS	32,32,25	57	40	■	
60			SP			S-13	SS	10,7,23	30	27	■	
					-1.00							
		64.0-66.25 ft. Very dense gray-black angular GRAVEL, trace silt (GP). <WEATHERED BEDROCK FRAGMENTS>	GP		64.00							
65						S-14	SS	46,56,50	<100	48		
					-3.25							
		AUGER REFUSAL - BORING TERMINATED AT 66.25' BELOW GROUND SURFACE.			66.25							
70												
75												
80												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

LOGGED: MRS

CHECKED: RMG

DATE: 03/20/91

Golder Associates

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-49

BORING DATE: 04/09/91

BORING LOCATION: N:552,204.40 E:696,305.30

SHEET: 1 OF 2

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					64.20							
0	8"x12" HSA	0.0-9.0 ft. V. dense, brown-pale brown c-f SAND, trace-some gravel, trace silt (SP). <FILL>	SP		0.00	S-1	SS	15,30,60	90	33	■	
5						S-2	SS	13,26,45	71	67	■	
					55.20							
10		9.0-64.0 ft. Compact-v. dense, gray-beige, c-f SAND, trace gravel, trace silt (SP). <OUTWASH SAND>			9.00	S-3	SS	2,5,6	11	67	■	
15						S-4	SS	3,4,11	15	100	■	
20						S-5	SS	2,3,5	8	100	■	
25			SP			S-6	SS	25,15,11	26	67	■	
30						S-7	SS	16,18,30	48	100	■	
35						S-8	SS	16,13,20	33	67	■	
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

LOGGED: DSL

CHECKED: RMG

DATE: 04/10/91

Golder Associates

PROJECT: INDUSTRIPLEX
PROJECT LOCATION: WOBURN
PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-49

BORING DATE: 04/09/91
BORING LOCATION: N:552,204.40 E:696,305.30

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					24.20							
40	8"x12" HSA	9.0-64.0 ft. Compact-v. dense, gray-beige, c-f SAND, trace gravel, trace silt (SP). <OUTWASH SAND>	SP		40.00	S-9	SS	11,18,33	51	87	■	
45						S-10	SS	12,25,40	65	100	■	
50						S-11	SS	15,25,28	53	100	■	
55						S-12	SS	15,26,30	56	100	■	
60						S-13	SS	9,12,19	31	100	■	
65		64.0-66.5 ft. V. dense, olive green-gray m-f SAND and SILT, little gravel (SM). <GLACIAL TILL>	SM		0.20 64.00	S-14	SS	37,100/.4	<100	67	■	
		AUGER REFUSAL - BORING TERMINATED AT 66.5' BELOW GROUND SURFACE.			-2.30 66.50							
70												
75												
80												

DRILL RIG: Brat 22R
DRILLING CONTRACTOR: D.L. Maher
DRILLER: JRM

LOGGED: DSL
CHECKED: RMG
DATE: 04/10/91

Golder Associates

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-50

BORING DATE: 04/04/91

BORING LOCATION: N:552,001.10 E:696,367.80

SHEET: 1 OF 2

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					66.80							
0	8"x12" HSA	0.0-12.5 ft. Compact, brown, c-f SAND, trace-little gravel trace silt (SP). <FILL>	SP		0.00	S-1	SS	4,11,18	29	80	■	
5						S-2	SS	25,11,25	36	67	■	
10						S-3	SS	27,30,35	65	100	■	
					54.30							
		12.5-56.3 ft. Loose-dense, beige-brown to gray, c-f SAND, little gravel, trace silt (SP). <OUTWASH SAND>			12.50							
15						S-4	SS	4,8,8	16	67	■	
20						S-5	SS	3,5,9	14	67	■	
25			SP			S-6	SS	15,16,30	46	33	■	
30						S-7	SS	3,3,6	9	67	■	
35						S-8	SS	8,11,18	29	100	■	
40												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

Golder Associates

LOGGED: DSL

CHECKED: RMG

DATE: 04/08/91

PROJECT: INDUSTRIPLEX

PROJECT LOCATION: WOBURN

PROJECT NUMBER: 893-6255

RECORD OF BOREHOLE OW-50

BORING DATE: 04/04/91

BORING LOCATION: N:552,001.10 E:696,357.80

SHEET: 2 OF 2

DATUM: MSL

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT	PENETRATION RESISTANCE BLOWS/FT ■ (20 40 60 80) / WATER CONTENT, PERCENT Wp ○ W Wl (20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
					26.60							
40	8"x12" HSA	12.5-56.3 ft. Loose-dense, beige-brown to gray, c-f SAND, little gravel, trace silt (SP). <OUTWASH SAND>	SP		40.00	S-9	SS	3,3,3	6	67	■	
45						S-10	SS	9,15,22	37	67	■	
50						S-11	SS	7,10,14	24	100	■	
55						S-12	SS	3,7,15	22	67	■	
					10.50							
		56.3-76.5 ft. Compact-v. dense, olive green to gray, c-f SAND, trace-some silt, little gravel (SP-SM). <GLACIAL TILL>			56.30							
60						S-13	SS	13,14,20	34	100	■	
65			SP-SM					N/S		■		
70						S-14	SS	4,4,9	13	67	■	
75						S-15	SS	3,15,55	70		■	
					-8.70							
		AUGER REFUSAL - BORING TERMINATED AT 76.5' BELOW GROUND SURFACE.			76.50							
80												

DRILL RIG: Brat 22R

DRILLING CONTRACTOR: D.L. Maher

DRILLER: JRM

LOGGED: DSL

CHECKED: RMG

DATE: 04/06/91

Golder Associates

APPENDIX C

Monitoring Well Construction Diagrams

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-43 SHEET 1 of 1

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 74.6 ft WATER DEPTH 9.0 ft.

WEATHER CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 76.17 ft DATE/TIME 04-02-91/0830

TEMP. 45 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1625/04-01-91 (TIME / DATE) COMPLETED 1200/04-03-91 (TIME / DATE)

LOCATION / COORDINATES N: 553,983.4 E: 696,106.8

MATERIALS INVENTORY

WELL CASING 4 in. dia. 10.5 l.f. WELL SCREEN 4 in. dia. 5 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

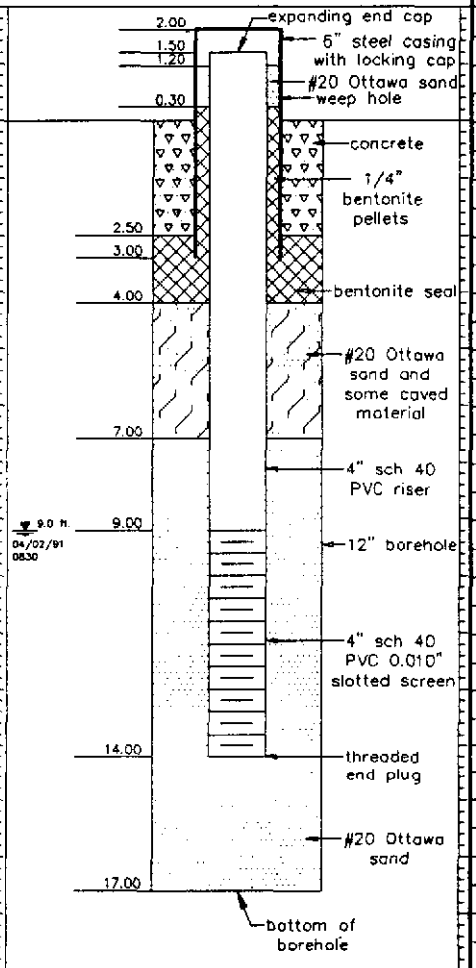
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY 150 LBS.

GROUT QUANTITY 0 CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0–2.0 ft. Compact, brown, c–f SAND, trace silt. (SP) <FILL>
	2.0–5.5 ft. Very loose, white–orange purple SILT. (CL)
5.00	<FILL>
	5.5–10.0 ft. Loose, brown–orange, c–f SAND, trace silt. (SP)
10.00	<FILL>
	10.0–17.0 ft. Very dense, olive–green grey, c–f SAND, trace silt, little–trace gravel. (SP)
15.00	<GLACIAL TILL>
	AUGER REFUSAL–BORING TERMINATED AT 17.0 FT. BELOW GROUND SURFACE
20.00	
25.00	

WELL SKETCH



INSTALLATION NOTES

A sand bridge in the augers during installation required the augers being pulled completely resulting in some caving between 7.0 and 4.0 ft.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development started on 04-05-91 and completed on 04-12-91. The first round of development was done with a centrifugal pump, after which all development was done using a Wattera foot valve and polyethelene tubing. Well was pumped dry during each development cycle.

A total of 148.5 gallons were purged with water remaining very turbid.

PH and conductivity stabilized with values of 8.3 and 1800 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-44 SHEET 1 of 1

GA INSP. MRS DRILLING METHOD 6-5/8" ID x 10" OD HSA GROUND ELEV. 69.3 ft. WATER DEPTH 1.5 ft.

WEATHER PARTLY CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 70.60 ft. DATE/TIME 04-11-91/1140

TEMP. 55 F. DRILL RIG MOBILE B-53 ATV DRILLER JAG STARTED 1600/04-11-91 (TIME / DATE) COMPLETED 1730/04-11-91 (TIME / DATE)

LOCATION / COORDINATES N: 553,902.3 E: 696,123.8

MATERIALS INVENTORY

WELL CASING 4 in. dia. 8.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

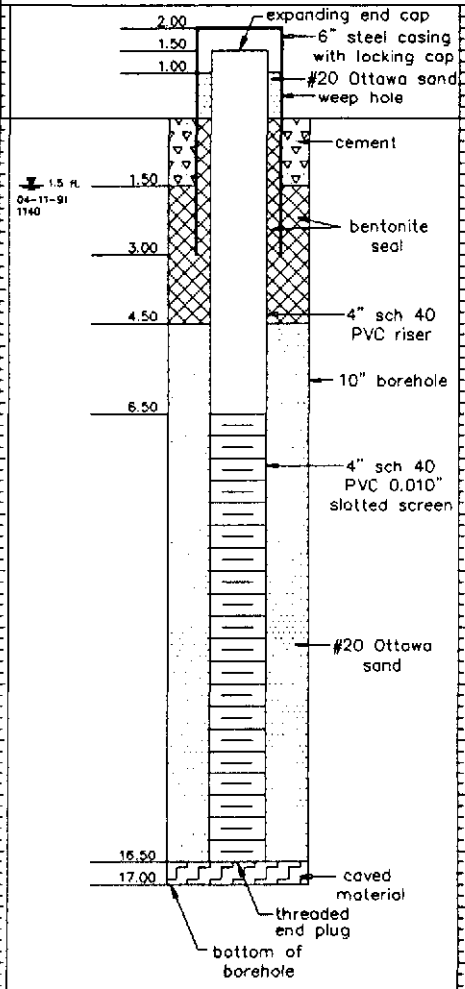
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY NONE CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-0.3 ft. Soft brown SILT, some c-f sand, some c-f gravel, root mass. (ML)
	0.3-1.3 ft. Firm, red-purple SILT, some f-sand, little c-f gravel. (ML) <FILL>
5.00	1.3-9.8 ft. Loose to compact, c-f, light brown SAND, trace silt. (SP)
	<OUTWASH SAND>
10.00	9.8-17.0 ft. Very dense, olive grey, c-f SAND and c-f GRAVEL, trace silt. (SP)
15.00	<GALCIAL TILL>
	AUGER REFUSAL-BORING TERMINATED AT 17.0 FT BELOW GROUND SURFACE
20.00	
25.00	

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

The well was developed on 04-16-91 and 80 gallons were removed using a Wattera pump. PH and conductivilty stabilized with values of 5.38 and 1840 umho/cm respectively. The water remained very turbid.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-45 SHEET 1 of 1

GA INSP. MRS DRILLING METHOD 6-5/8" ID x 10" OD HSA GROUND ELEV. 69.4 ft WATER DEPTH 1.5 ft.

WEATHER CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 70.84 ft. DATE/TIME 04-10-91/1100

TEMP. 55 F. DRILL RIG MOBILE B-53 ATV DRILLER JAG STARTED 1350/04-10-91 (TIME / DATE) COMPLETED 0900/04-11-91 (TIME / DATE)

LOCATION / COORDINATES N: 553,581.5 E: 696,162.5

MATERIALS INVENTORY

WELL CASING 4 in. dia. 8.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL 1/4" BENTONITE PELLETS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

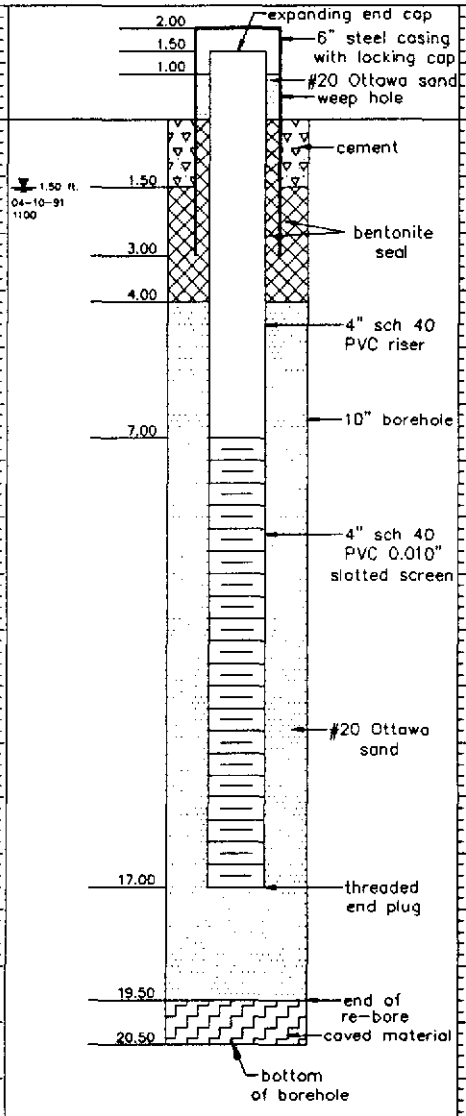
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 0 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-0.6 ft. Firm, dark brown SILT and SAND, little c-f gravel, root mass.
	0.6-3.9 ft. Construction waste including concrete and brick.
5.00	3.9-7.2 ft. Compacted, brown, c-f SAND, some c-f gravel, little silt. (SP-SM)
	<OUTWASH SAND>
10.00	7.2-20.5 ft. Very dense, c-f, multi-compositional GRAVEL, and c-f, olive grey SAND, trace silt. (GP)
15.00	
20.00	<GLACIAL TILL>
	AUGER REFUSAL-BORING TERMINATED AT 20.5 FT. BELOW GROUND SURFACE
25.00	

WELL SKETCH



INSTALLATION NOTES

Due to proximity of screen to surface, bentonite pellets were used in lieu of liquid grout.

1.5 ft. water level necessitated use of pellets to 1.5 ft. below ground surface, cemented from that point to surface.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-16-91 and 130 gallons of water were removed using a Wattera foot valve. PH and conductivity stabilized with values of 7.14 and 1800 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-46 SHEET 1 of 1

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 68.2 ft. WATER DEPTH 4.8 ft.

WEATHER OVERCAST DRILLING COMPANY D.L. MAHER COLLAR ELEV. 67.88 ft. DATE/TIME 03-27-91/0650

TEMP. 40 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1510/03-26-91 (TIME / DATE) COMPLETED 1630/03-28-91 (TIME / DATE)

LOCATION / COORDINATES N: 553,059.9 E: 696,119.2

MATERIALS INVENTORY

WELL CASING 4 in. dia. 8.1 l.f. WELL SCREEN 4 in. dia. 5 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

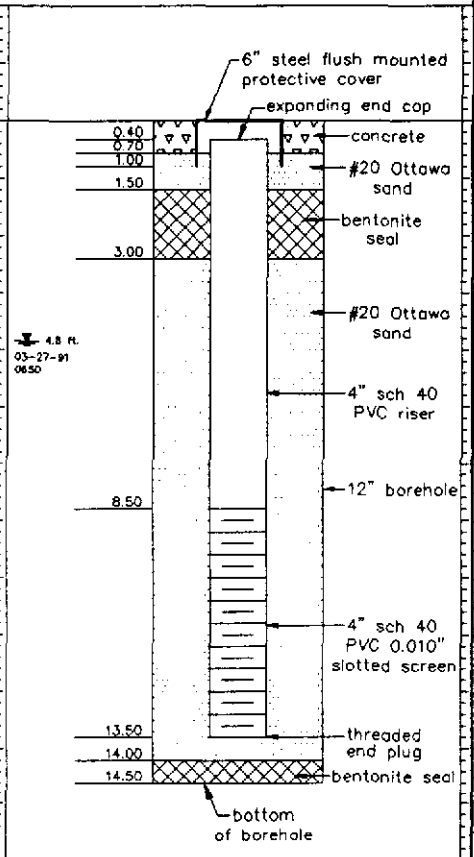
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 150 LBS.

GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0–2.5 ft. Very dense, c–f SAND, little gravel, trace silt. (SP) <FILL>
	2.5–7.5 ft. Compact, pale brown–grey, c–f SAND, trace silt. (SP) <FILL>
5.00	
	7.5–10.5 ft. Compact, dark purple, f–m SAND and SILT. (SM) <FILL>
10.00	
	10.5–12.5 ft. Compact, grey, f–m SAND and SILT. (SM) <FINE GRAINED GLACIAL TILL>
	12.5–14.5 ft. Very dense, olive green–grey, f–m SAND, some gravel, little silt. (SP) <GLACIAL TILL>
15.00	AUGER REFUSAL–BORING TERMINATED AT 14.5 FT. BELOW GROUND SURFACE
20.00	
25.00	

WELL SKETCH



INSTALLATION NOTES

Difficulty installing the well due to high turbidity of water. The well had to be held down in place while the sand pack was being added.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development was started on 04-05-91 and completed on 04-12-91. 32 gallons of water were removed using a Wattera foot valve, and the well was pumped dry with each cycle. PH and conductivity stabilized with values of 7.19 and 1200 umho/cm respectively. The water remained cloudy.

Golder Associates

MONITORING WELL INSTALLATION LOG

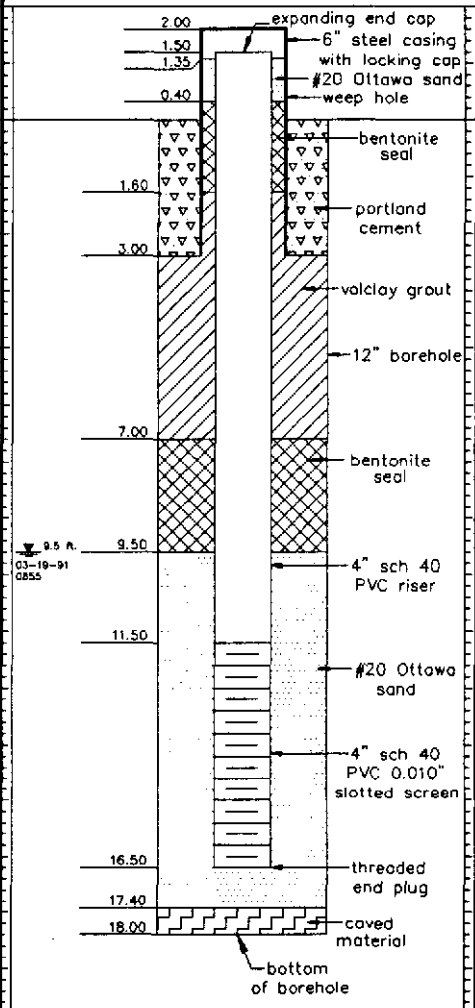
JOB NO. 893-6255	PROJECT INDUSTRI-PLEX/WOBURN/MASS		WELL NO. OW-47	SHEET 1 of 1	
GA INSP. MRS	DRILLING METHOD 8" ID x 12" OD HSA		GROUND ELEV. 67.8 ft.	WATER DEPTH 9.5 ft.	
WEATHER	DRILLING COMPANY D.L. MAHER		COLLAR ELEV. 69.23 ft.	DATE/TIME 03-19-91/0855	
TEMP.	DRILL RIG BRAT 22R	DRILLER JRM	STARTED 0840/03-19-91 TIME / DATE	COMPLETED 0830/03-28-91 TIME / DATE	
LOCATION / COORDINATES N: 552,754.2 E: 696,165.3					

MATERIALS INVENTORY

WELL CASING 4 in. dia. 13 l.f.	WELL SCREEN 4 in. dia. 5 l.f.		BENTONITE SEAL 1/4" BENTONITE PELLETS		
CASING TYPE SCH 40 PVC	SCREEN TYPE SCH 40 PVC		INSTALLATION METHOD GRAVITY		
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.010" MACHINE SLOTTED		FILTER PACK QTY. 300 LBS.		
GROUT QUANTITY 155 GALLONS	CENTRALIZERS NONE USED		FILTER PACK TYPE #20 OTTAWA SAND		
GROUT TYPE VOLCLAY	DRILLING MUD TYPE N/A		INSTALLATION METHOD GRAVITY		

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0–0.6 ft. Loose, brown, c–f SAND, some silt, some f–gravel, root moss. (SM)
	0.6–1.4 ft. Dense, grey, c–f GRAVEL, some c–f sand, trace silt, cobbles present. (GP)
	1.4–2.5 ft. Purple, c–f SAND, some silt. (SM)
5.00	5.0–9.0 ft. Stiff, white CLAY. (CH)
	<FILL>
10.00	9.0–14.0 ft. Compact, olive grey, m–f SAND, little black silt, abundant muscovite flakes. (SP–SM)
	<OUTWASH SAND>
15.00	14.0–18.0 ft. Very dense, orange to olive grey, c–f SAND and GRAVEL, trace silt. (SP)
	<GLACIAL TILL>
	AUGER REFUSAL–BORING TERMINATED AT 18.0 FT. BELOW GROUND SURFACE
20.00	
25.00	

WELL SKETCH



INSTALLATION NOTES

Hole "took" grout at approximately 8.0 ft. below ground surface.

55 gallons of water were used to flush hole.

No water used in drilling.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

The well was developed on 04/16/91 and 130 gallons were removed using a Wattera foot valve and polyethelene tubing. PH and conductivity stabilized with values of 7.14 and 1800 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-48 SHEET 1 of 3

GA INSP. MRS DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 63.0 ft WATER DEPTH 6.5 ft.

WEATHER PARTLY CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 64.72 ft. DATE/TIME 03-21-91/0900

TEMP. 45-50 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0845/03-22-91 (TIME / DATE) COMPLETED 0930/03-27-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,337.6 E: 696,264.5

MATERIALS INVENTORY

WELL CASING 4 in. dia. 36.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

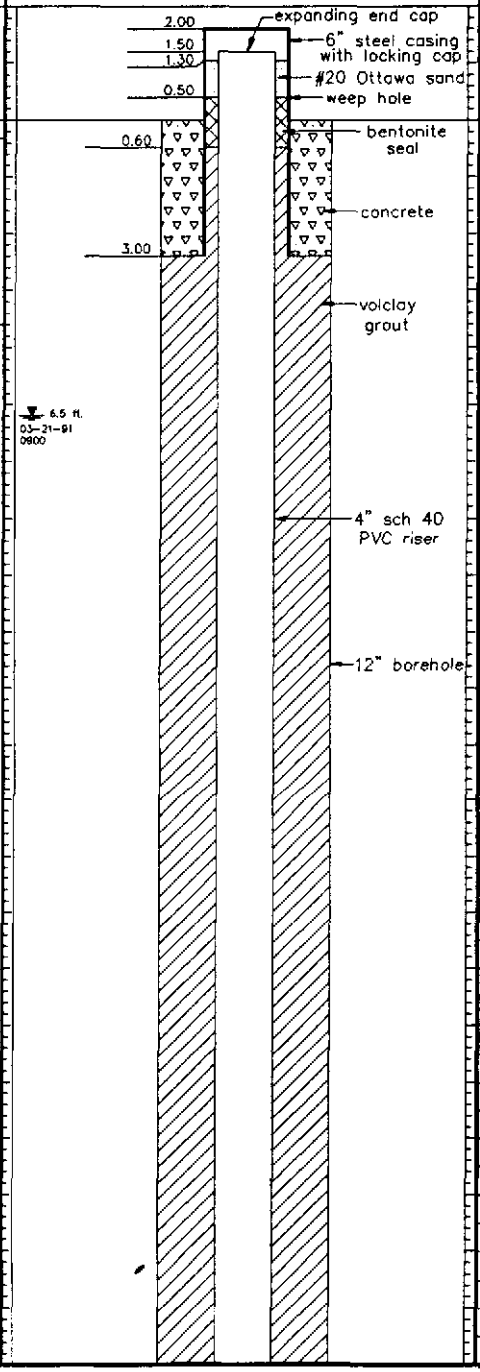
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 185 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-0.4 ft. Compact, brown, c-f SAND and GRAVEL. (SP-SM) <FILL>
	0.4-4.5 ft. Cobbles and boulders. <FILL>
5.00	4.5-26.5 ft. Loose, brown-black, c-f SAND, little c-f gravel, little silt, organics, wood, hides and burlap present. (SP-SM)
10.00	
15.00	
20.00	
25.00	<FILL>
	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development was started on 04-04-91 and completed on 04-05-91 using a centrifugal pump. A total of 925 gallons were purged. PH and conductivity stabilized with values of 5.6 and 990 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-48 SHEET 2 of 3

GA INSP. MRS DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 63.0 ft. WATER DEPTH 6.5 ft.

WEATHER PARTLY CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 64.72 ft. DATE/TIME 03-21-91/0900

TEMP. 45-50 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0845/03-22-91 (TIME / DATE) COMPLETED 0930/03-27-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,337.6 E: 696,264.5

MATERIALS INVENTORY

WELL CASING 4 in. dia. 36.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

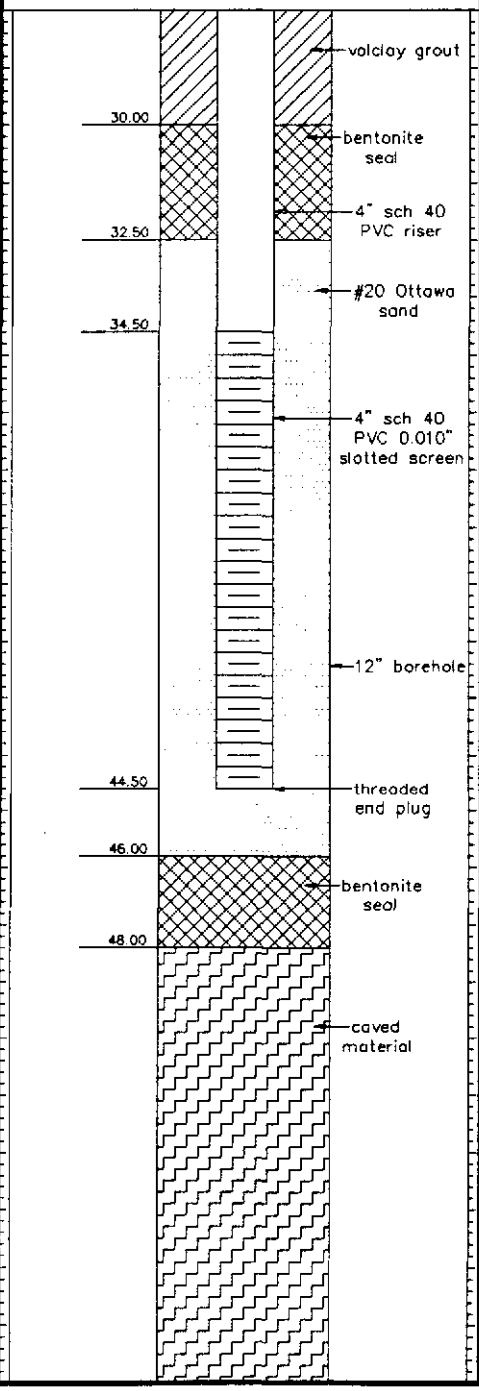
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 185 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	26.5-52.5 ft. Loose-dense, c-f SAND, trace f-gravel, trace silt. (SP)
30.0	
35.00	
40.00	
45.00	
50.00	
	<OUTWASH SAND>
	52.5-66.25 ft. Dense-very dense, olive grey SAND, some gravel, trace silt. (SP)
55.00	
	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development was started on 04-04-91 and completed on 04-05-91 using a centrifugal pump.

A total of 925 gallons were purged.

PH and conductivity stabilized with values of 5.6 and 990 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-48 SHEET 3 of 3

GA INSP. MRS DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 63.0 ft. WATER DEPTH 6.5 ft.

WEATHER PARTLY CLOUDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 64.72 ft. DATE/TIME 03-21-91/0900

TEMP. 45-50 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0845/03-22-91 (TIME / DATE) COMPLETED 0930/03-27-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,337.6 E: 696,264.5

MATERIALS INVENTORY

WELL CASING 4 in. dia. 36.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

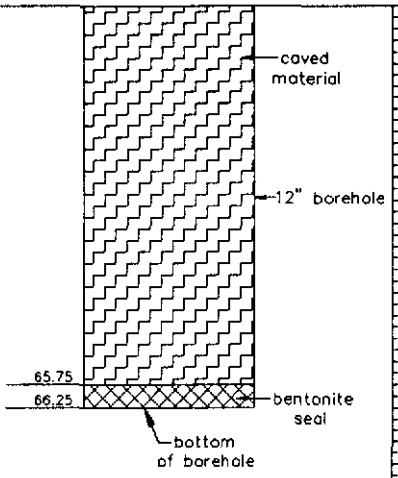
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 185 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
60.00	52.5-66.25 ft. Dense-very dense, olive grey SAND, some gravel, trace silt. (SP)
65.00	<GLACIAL TILL>
	AUGER REFUSAL-BORING TERMINATED AT 66.25 FT. BELOW GROUND SURFACE
70.00	
75.00	
80.00	
85.00	

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development was started on 04-04-91 and completed on 04-05-91 using a centrifugal pump.

A total of 925 gallons were purged.

PH and conductivity stabilized with values of 5.6 and 990 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-48A SHEET 1 of 1

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 62.70 ft WATER DEPTH 7.0 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 64.39 ft. DATE/TIME 03-26-91/0830

TEMP. 35-40 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1505/03-25-91 COMPLETED 1000/03-26-91

LOCATION / COORDINATES N: 552,334.9 E: 696,254.2

MATERIALS INVENTORY

WELL CASING 4 in. dia. 16 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

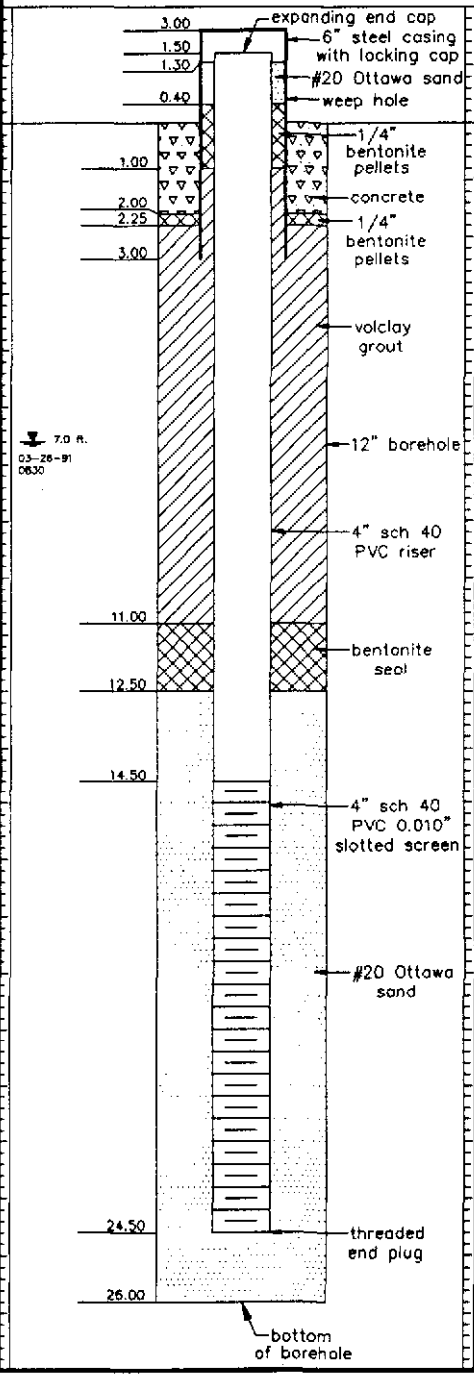
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 525 LBS.

GROUT QUANTITY 100 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	FOR SOIL DESCRIPTIONS SEE LOG OW-48.
25.00	BORING TERMINATED AT 26.0 FT. BELOW GROUND SURFACE

WELL SKETCH



INSTALLATION NOTES

Adjacent to well to OW-48 hole not sampled.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-04-91 and 215 gallons of water were removed using a centrifugal pump and black polypropylene tubing.

The wel recovered instantly.

PH and conductivity stabilized with values of 5.33 and 1800 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-49 SHEET 1 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 64.2 ft. WATER DEPTH 8.0 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 66.06 ft. DATE/TIME 04-11-91/0830

TEMP. 50-60 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0830/04-11-91 (TIME / DATE) COMPLETED 1430/04-11-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,204.4 E: 696,305.3

MATERIALS INVENTORY

WELL CASING 4 in. dia. 47.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

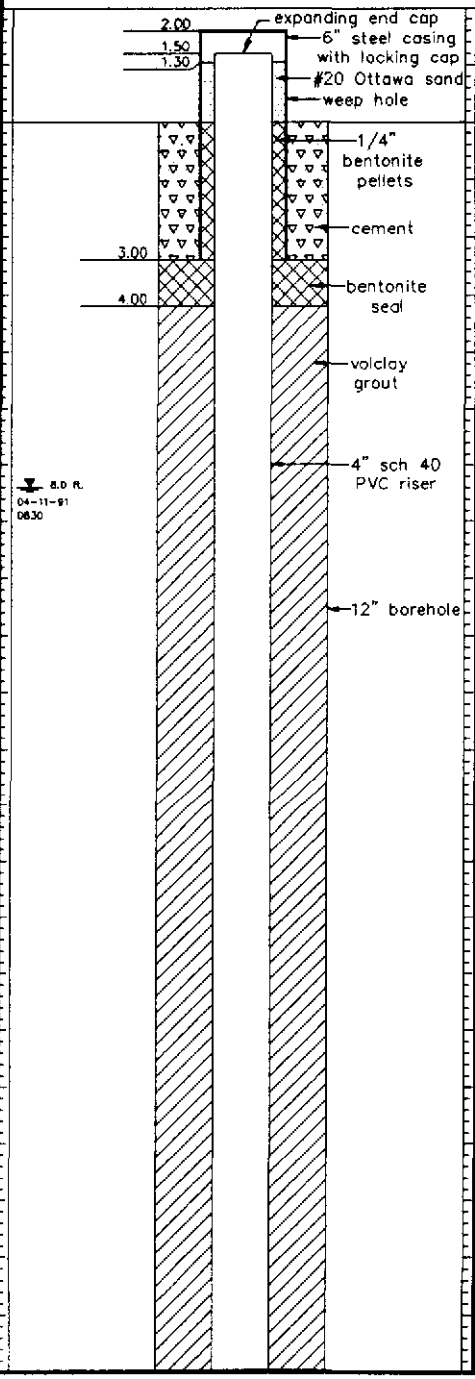
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 250 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #2D OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-9.0 ft. Very dense, brown, c-f SAND, trace-some gravel, trace silt. (SP)
5.00	
	<FILL>
10.00	9.0-64.0 ft. Compact, very dense, grey-beige, c-f SAND, trace gravel, trace silt. (SP)
15.00	
20.00	
25.00	
	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-17-91 and 610 gallons of water were removed using a centrifugal pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.88 and 4000 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-49 SHEET 2 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 64.2 ft. WATER DEPTH 8.0 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 66.06 ft. DATE/TIME 04-11-91/0830

TEMP 50-60 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0830/04-11-91 (TIME / DATE) COMPLETED 1430/04-11-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,204.4 E: 696,305.3

MATERIALS INVENTORY

WELL CASING 4 in. dia. 47.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 250 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
30.00	9.0-64.0 ft. Compact, very dense, grey-beige, c-f SAND, trace gravel, trace silt. (SP)	12" borehole; volclay grout; 4" sch 40 PVC riser; 42.00; bentonite seal; 44.00; #20 Ottawa sand; 46.00; 4" sch 40 PVC 0.010" slotted screen; 56.00; threaded end plug; 57.00; bentonite seal	Collar elevation refers to top of PVC riser.
35.00			
40.00			
45.00			WELL DEVELOPMENT NOTES: Well developed on 04-17-91 and 610 gallons of water were removed using a centrifugal pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.88 and 4000 umho/cm respectively.
50.00			
55.00	CONTINUED ON NEXT PAGE.		

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-49 SHEET 3 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 64.2 ft. WATER DEPTH 8.0 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 66.06 ft. DATE/TIME 04-11-91/0830

TEMP. 50-60 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0830/04-11-91 (TIME / DATE) COMPLETED 1430/04-11-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,204.4 E: 696,305.3

MATERIALS INVENTORY

WELL CASING 4 in. dia. 47.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

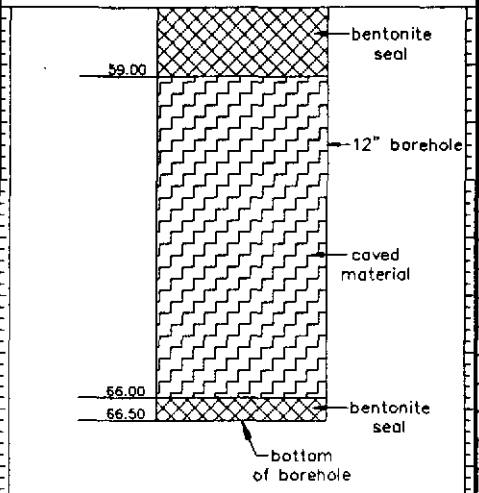
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 550 LBS.

GROUT QUANTITY 250 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
60.00	9.0-64.0 ft. Compact, very dense, grey-beige, c-f SAND, trace gravel, trace silt. (SP)
	<OUTWASH SAND>
65.00	64.0-66.5 ft. Very dense, olive green-grey, m-f SAND and SILT, little gravel. (SM)
	<TILL>
	AUGER REFUSAL-BORING TERMINATED AT 66.5 FT. BELOW GROUND SURFACE
70.00	
75.00	
80.00	
85.00	

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-17-91 and 610 gallons of water were removed using a centrifugal pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.88 and 4000 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-49A SHEET 1 of 2

GA INSP. MRS DRILLING METHOD 6-5/8" ID x 10" OD HSA GROUND ELEV. 65.2 ft WATER DEPTH 8.0 ft.

WEATHER CLEAR, WINDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 66.42 ft. DATE/TIME 04-11-91/0810

TEMP. 50 F. DRILL RIG MOBILE B-53 ATV DRILLER JAC STARTED 1400/04-12-91 (TIME / DATE) COMPLETED 1000/04-15-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,193.5 E: 696,308.4

MATERIALS INVENTORY

WELL CASING 4 in. dia. 17.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

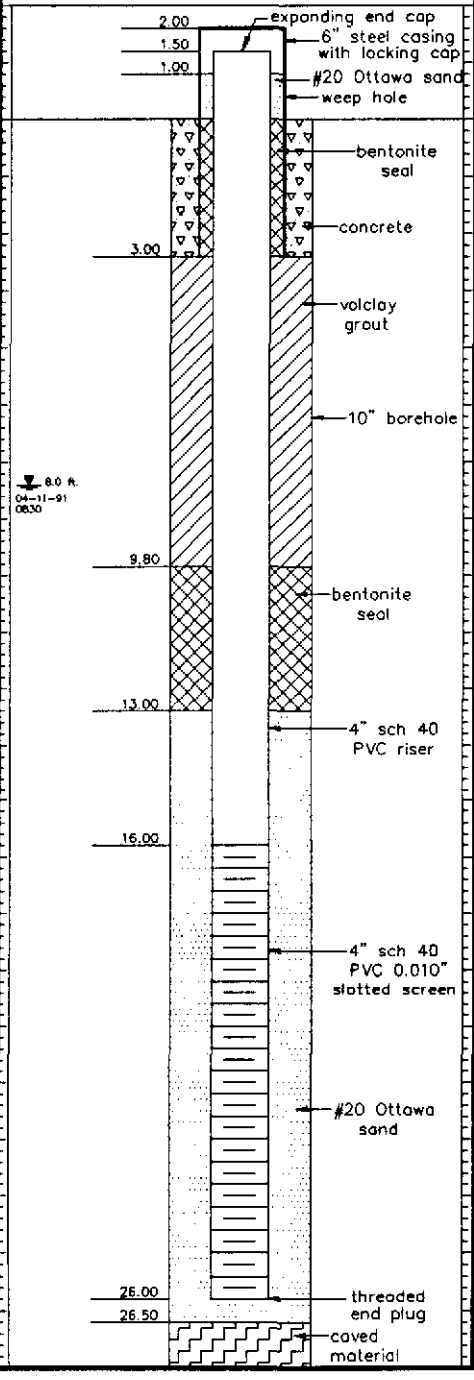
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 450 LBS.

GROUT QUANTITY NONE CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	FOR SOIL DESCRIPTIONS SEE LOG OW-49.
5.00	
10.00	
15.00	
20.00	
25.00	
	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Adjacent to well OW-49 hole not sampled

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-16-91 and 250 gallons of water were removed using a centrifugal pump with block polypropylene tubing. The well recharged instantly. PH and conductivity stabilized with values of 5.89 and 1300 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-49A SHEET 2 of 2

GA INSP. MRS DRILLING METHOD 6-5/8" ID x 10" OD HSA GROUND ELEV. 65.2 ft. WATER DEPTH 8.0 ft.

WEATHER CLEAR, WINDY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 66.42 ft. DATE/TIME 04-11-91/0810

TEMP. 50 F. DRILL RIG MOBILE B-53 ATV DRILLER JAG STARTED 1400/04-12-91 (TIME / DATE) COMPLETED 1000/04-15-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,193.5 E: 696,308.4

MATERIALS INVENTORY

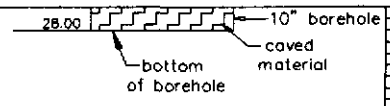
WELL CASING 4 in. dia. 17.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 450 LBS.

GROUT QUANTITY NONE CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	BORING TERMINATED AT 28.0 FT. BELOW GROUND SURFACE		Adjacent to well OW-49 hole not sampled. Collar elevation refers to top of PVC riser.
30.00			
35.00			
40.00			
45.00			WELL DEVELOPMENT NOTES Well developed on 04-16-91 and 250 gallons of water were removed using a centrifugal pump with black polypropylene tubing. The well recharged instantly. PH and conductivity stabilized with values of 5.89 and 1300 umho/cm respectively.
50.00			
55.00			

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-50 SHEET 1 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 66.8 ft. WATER DEPTH 11 ft.

WEATHER SUNNY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 68.38 ft. DATE/TIME 04-08-91/0815

TEMP. 75-85 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1400/04-08-91 (TIME / DATE) COMPLETED 1200/04-09-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,001.1 E: 696,357.8

MATERIALS INVENTORY

WELL CASING 4 in. dia. 41.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

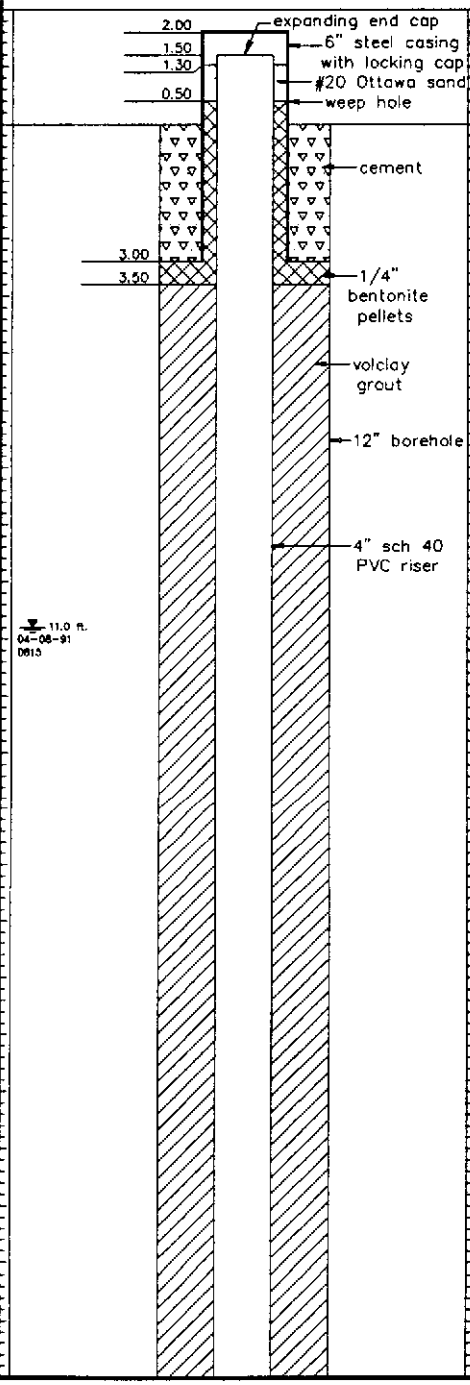
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY 600 LBS.

GROUT QUANTITY 150 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-12.5 ft. Compact, brown, c-f SAND, trace-little gravel, trace silt. (SP)
5.00	
10.00	<FILL>
	12.5-56.3 ft. Loose-dense, beige brown to grey, c-f SAND, little gravel, trace silt. (SP)
15.00	
20.00	
25.00	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development started on 04-15-91 and completed on 04-17-91. 1400 gallons of water were removed using a submersible pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.84 and 2800 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-50 SHEET 2 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 66.8 ft. WATER DEPTH 11 ft.

WEATHER SUNNY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 68.38 ft. DATE/TIME 04-08-91/0815

TEMP. 75-85 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1400/04-08-91 (TIME / DATE) COMPLETED 1200/04-09-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,001.1 E: 696,357.8

MATERIALS INVENTORY

WELL CASING 4 in. dia. 41.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

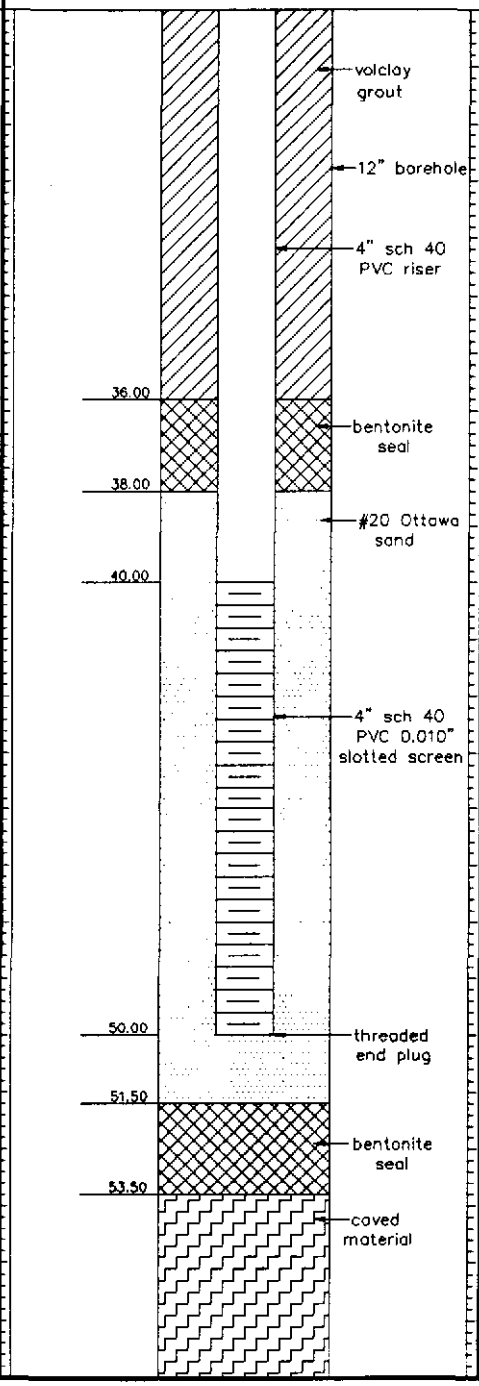
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 600 LBS.

GROUT QUANTITY 150 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
30.00	12.5–56.3 ft. Loose–dense, beige brown to grey, c–f SAND, little gravel, trace silt. (SP)
35.00	
40.00	
45.00	
50.00	
55.00	<OUTWASH SAND>
	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development started on 04-15-91 and completed on 04-17-91. 1400 gallons of water were removed using a submersible pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.84 and 2800 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-50 SHEET 3 of 3

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 66.8 ft. WATER DEPTH 11 ft.

WEATHER SUNNY DRILLING COMPANY D.L. MAHER COLLAR ELEV. 68.38 ft. DATE/TIME 04-08-91/0815

TEMP. 75-85 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 1400/04-08-91 (TIME / DATE) COMPLETED 1200/04-09-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,001.1 E: 696,357.8

MATERIALS INVENTORY

WELL CASING 4 in. dia. 41.5 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

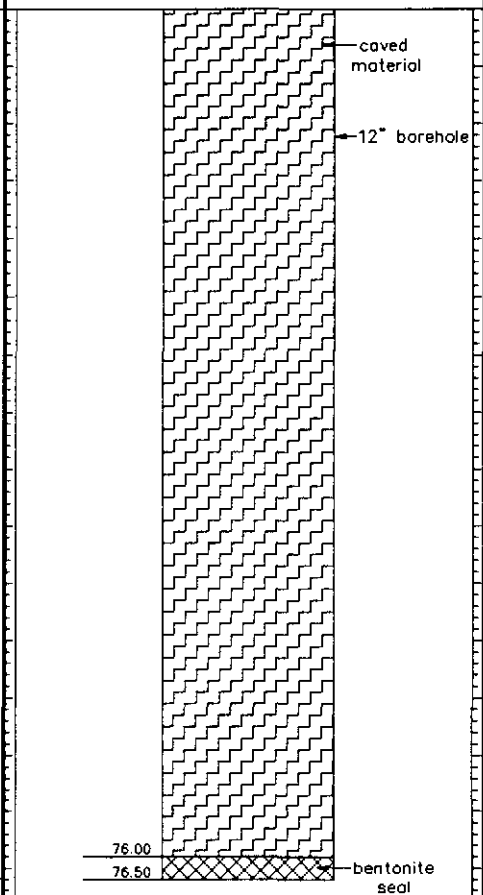
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 600 LBS.

GROUT QUANTITY 150 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
60.00	56.3-76.5 ft. Compact-very dense, olive green to grey, c-f SAND, trace-some silt, little gravel. (SP-SM)
65.00	
70.00	
75.00	
	<GALCIAL TILL>
	AUGER REFUSAL-BORING TERMINATED AT 76.5 FT. BELOW GROUND SURFACE.
80.00	
85.00	

WELL SKETCH



INSTALLATION NOTES

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well development started on 04-15-91 and completed on 04-17-91. 1400 gallons of water were removed using a submersible pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.84 and 2800 umho/cm respectively.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-50A SHEET 1 of 2

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 66.5 ft WATER DEPTH 10.8 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 68.00 ft. DATE/TIME 04-12-91/1030

TEMP. 55 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0800/04-12-91 (TIME / DATE) COMPLETED 0830/04-15-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,007.0 E: 696,353.3

MATERIALS INVENTORY

WELL CASING 4 in. dia. 20.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

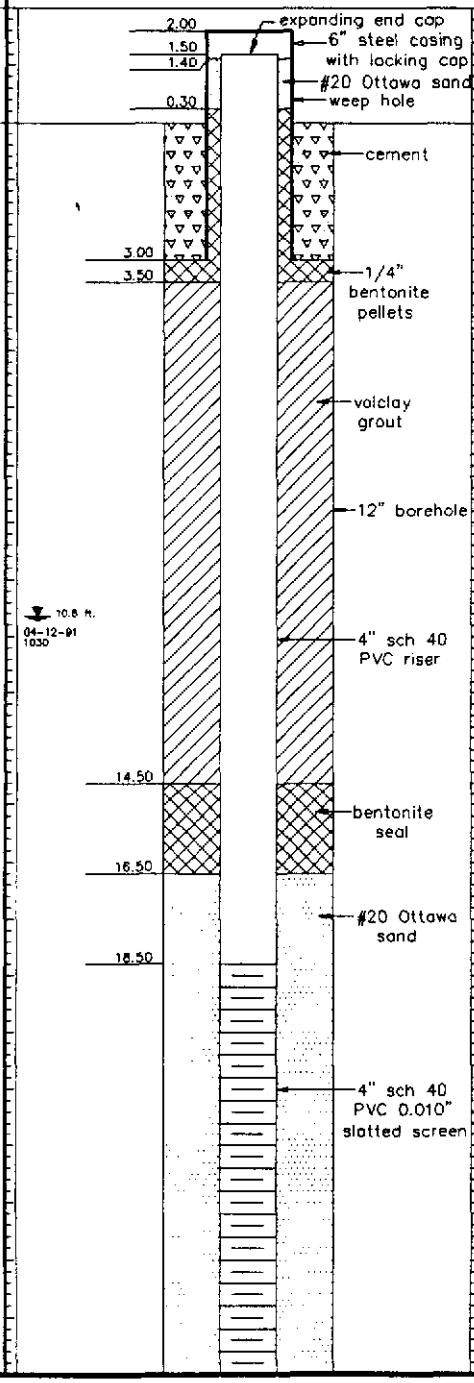
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 400 LBS.

GROUT QUANTITY 70 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	FOR SOIL DESCRIPTIONS SEE LOG OW-50.
5.00	
10.00	
15.00	
20.00	
25.00	CONTINUED ON NEXT PAGE.

WELL SKETCH



INSTALLATION NOTES

Adjacent to well OW-50 hole not sampled

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-15-91 and 180 gallons of water were removed using a centrifugal pump and black polypropylene tubing. PH and conductivity stabilized with values of 5.46 and 1800 umho/cm respectively.

MONITORING WELL INSTALLATION LOG

JOB NO. 893-6255 PROJECT INDUSTRI-PLEX/WOBURN/MASS WELL NO. OW-50A SHEET 2 of 2

GA INSP. DSL DRILLING METHOD 8" ID x 12" OD HSA GROUND ELEV. 66.5 ft. WATER DEPTH 10.8 ft.

WEATHER FAIR DRILLING COMPANY D.L. MAHER COLLAR ELEV. 68.00 ft. DATE/TIME 04-12-91/1030

TEMP. 55 F. DRILL RIG BRAT 22R DRILLER JRM STARTED 0800/04-12-91 (TIME / DATE) COMPLETED 0830/04-15-91 (TIME / DATE)

LOCATION / COORDINATES N: 552,007.0 E: 696,353.3

MATERIALS INVENTORY

WELL CASING 4 in. dia. 20.0 l.f. WELL SCREEN 4 in. dia. 10 l.f. BENTONITE SEAL ENVIROPLUG BENTONITE CHIPS

CASING TYPE SCH 40 PVC SCREEN TYPE SCH 40 PVC INSTALLATION METHOD GRAVITY

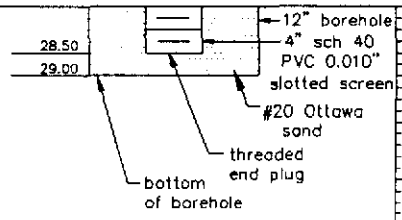
JOINT TYPE FLUSH THREADED SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY 400 LBS.

GROUT QUANTITY 70 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE #20 OTTAWA SAND

GROUT TYPE VOLCLAY DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

DEPTH	SOIL/ROCK DESCRIPTION
30.00	BORING TERMINATED AT 29.0 FT. BELOW GROUND SURFACE
35.00	
40.00	
45.00	
50.00	
55.00	

WELL SKETCH



INSTALLATION NOTES

Adjacent to well OW-50 hole not sampled.

Collar elevation refers to top of PVC riser.

WELL DEVELOPMENT NOTES

Well developed on 04-15-91 and 180 gallons of water were removed using a centrifugal pump and black polypropylene tubing.

PH and conductivity stabilized with values of 5.46 and 1800 umho/cm respectively.

APPENDIX D

Well Development Forms

WELL DEVELOPMENT FIELD RECORD

JOB NAME Industri-Plex/Woburn/Mass JOB NO. 893-6255.16 WELL NO. OW-43

DEVELOPED BY Mike Zasenski DATE OF INSTALL. 4/1/91 - 4/3/91 SHEET 1 OF 2

STARTED DEVEL. 4/5/91 (DATE) / 1155 (TIME) COMPLETED DEVEL. 4/12/91 (DATE) / 1600 (TIME)

W.L. BEFORE DEVEL. 6.20' (DEPTH) / 4/5/91 (DATE) / 1144 (TIME) AFTER DEVEL. ____ (DEPTH) / ____ (DATE) / ____ (TIME)

WELL DEPTH: BEFORE DEVEL. 15.7' AFTER DEVEL. 15.7' WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) 9.5' STANDING WELL VOLUME 6.19 gal.

SCREEN LENGTH 5' DRILLING WATER LOSS 400 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/5/91 1155	6.0	380	17.8	6.79		Very Turbid, well went dry
1220	—	—	—	—	—	DTW ≈ 15.0' well recharging extremely slow
1445	—	—	—	—	—	DTW = 14.0'
4/8/91 1220	~~12~~ 6.0	840	11.7	6.95		Very Turbid
4/9/91 959	15	1300	10.5	6.62		Very Turbid
	15.5	1300	11.8	6.71		Very Turbid
4/10/91 8					PWL 10.81	
4/10/91 855	16.5	1600	8.8	6.61		very turbid
4/10/91 858	18.5					very turbid
	18.5	... = TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: First round of development done with Centrifgul Pump, after that all development performed with a Waterra foot valve and Polyethylene Tubing. Well Pumped dry during each cycle of development.

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME: ISRT/Woburn/MA JOB NO.: 893-6255 WELL NO.: OW-44

DEVELOPED BY: MRS DATE OF INSTALL: 4/11/91 SHEET 1 OF 1

STARTED DEVEL.: 4/16/91 (DATE), 1540 (TIME) COMPLETED DEVEL.: 4/16/91 (DATE), 1545 (TIME)

W.L. BEFORE DEVEL. (-top PVC): 2.83 (DEPTH), 4/16/91 (DATE), 1530 (TIME) AFTER DEVEL.: 2.88 (DEPTH), 4/16/91 (DATE), 1800 (TIME)

WELL DEPTH: BEFORE DEVEL. (top PVC): 17.45 AFTER DEVEL.: ______ WELL DIA. (In): 4

STANDING WATER COLUMN (FT.): 14.62 STANDING WELL VOLUME: 9.5 gal.

SCREEN LENGTH: 10 DRILLING WATER LOSS: 90 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/16/91 1545	1 gal	1150	NA	5.75		very cloudy
1550	5 gal	1150	↓	5.45		" sample became
1554	10 gal	3700		5.56		" slightly red
1600	15 gal	1330		5.45		" color &
1605	20 gal	5200		5.47		" strong smell.
1610	25 gal	3000		5.23		
1615	30 gal	2550		5.15		
1625	40 gal	2820		5.49		
1635	50 gal	1580		5.19		
1718	60 gal	1800		5.27		
1730	70 gal	1750		5.02		
1737	75 gal	1850		5.30		
1745	80 gal	1840	↓	5.38		
	80	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Watera pump

Start 15:43:00

NOTES: (top PVC)
10 sec 5.55 2 min 4.00 15 min 2.88
30 sec 5.25 4 min 3.42
60 sec 4.61 8 min 3.05

WELL DEVELOPMENT FIELD RECORD

JOB NAME Industri P|Woburn|Mass JOB NO. 893-6255.16 WELL NO. MW-46
3/26-3/28/91

DEVELOPED BY Mike Zarenski DATE OF INSTALL ~~3/26/91~~ SHEET 1 OF 2

STARTED DEVEL. 4/5/91 (DATE) / 1030 (TIME) COMPLETED DEVEL. 4/12/91 (DATE) / 1530 (TIME)

W.L. BEFORE DEVEL. 3.32 (DEPTH) / 0997 (DATE) / 4/5/91 (TIME) AFTER DEVEL. ____ (DEPTH) / ____ (DATE) / ____ (TIME)

WELL DEPTH: BEFORE DEVEL. 13.5' AFTER DEVEL. 13.5' WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) 9.68' STANDING WELL VOLUME 6.31 gal.

SCREEN LENGTH 5' DRILLING WATER LOSS 100 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/5/91 1030	6.0	—	—	—	—	slightly Turbid
						well went Dry
1050	9.0	300	16.1	7.96		rapidly
						measured well
						Depth = 13.5'
						from Ground Surface
1500	—	—	—	—	—	DTW = 11.5'
4/8/91 1395	21	820	9.9	7.33		water slightly
4/9/91 0833	21	1200 *	10.1	7.11	DTW = 6.90	Turbid
4/9/91 0841	23	980	10.1	7.28		water cloudy
4/10/91 0804	23½	1400	10.7	7.57	DTW 5.94	water clear
4/10/91 0810	25	1200	8.9	7.70		water cloudy
4/10/91 0815	26½					water cloudy
	26.5	= TOTAL VOLUME REMOVED (gal.)				

* METER SET AT 1000 range - reading not reliable

DEVELOPMENT METHOD: ____

NOTES: Water column = Well Depth - DTW = 13.5 (Ground) - 3.82 (= DTW from Grnd) = 9.68

WELL DEVELOPMENT FIELD RECORD

JOB NAME Industr. P/Woburn/Mass JOB NO. 893-6255.37 WELL NO. OW 47

DEVELOPED BY mike Zarenski DATE OF INSTALL 3/19-28/91 SHEET 1 OF 2

STARTED DEVEL. 1055 / 1055 (DATE / TIME) COMPLETED DEVEL. 4/12/91 / 1636 (DATE / TIME)

W.L. BEFORE DEVEL. 9.89 / ~~4/8/91~~ 4/8/91 / 1045 (DEPTH / DATE / TIME) AFTER DEVEL. ____ / ____ / ____ (DEPTH / DATE / TIME)

WELL DEPTH: BEFORE DEVEL. 18.0 AFTER DEVEL. ____ WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) 8.11 STANDING WELL VOLUME 5.29 gal.

SCREEN LENGTH 5' DRILLING WATER LOSS 60 ~~gal~~ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/8/91 - 1055	6 gal	2800	17.1	6.49		Very Turbid
4/9/91 901					WL 9.98	NOTE: WATERRA TUBING IN WELL WHEN WL TAKEN
4/9/91 904	6½ gal	2500	11.4	6.42		VERY TURBID
4/9/91 908	8 gal	21000	10.1	6.44		VERY TURBID
4/9/91 909	9½ gal	2500	9.4	6.46		VERY TURBID
4/9/91 0915	11 gal	2500	11.0	6.63		Very Turbid
4/10/91 0905					PTW 10.11	
4/10/91 0907	12 gal	2800	8.1*	4.72*		VERY TURBID
4/10/91 0910	15 gal	21650	8.1	6.61		VERY TURBID
4/10/91 0915	16 gal	21650	8.0	6.59		TURBID
4/10/91 0920	18 gal	21650	8.2	6.69		TURBID
1039	19 gal	2650	8.2	6.54		Slightly Turbid
1042	23 gal	2600	8.3	6.58*		Slightly Turbid
1043	24	—	—	—		slightly Turbid
	24	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: First cycle of development completed using a centrifugal Pump. All other cycles performed using a waterra foot valve and polyethylene tubing

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Industri-Plex/Woburn JOB NO. 893-6255 WELL NO. GW48
3/22-27/91

DEVELOPED BY Mike Zaccaski DATE OF INSTALL. 3/27/91 SHEET 1 OF 2

STARTED DEVEL. 4/4/91 / 1537 COMPLETED DEVEL. 4/5/91 / 1415
DATE TIME DATE TIME

W.L. BEFORE DEVEL. 7.70' / 4/4/91 / 1202 AFTER DEVEL. 8.0' / /
DEPTH DATE TIME DEPTH DATE TIME

WELL DEPTH: BEFORE DEVEL. ~~46.0~~ 46.0' AFTER DEVEL. _____ WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) 38.3' STANDING WELL VOLUME 24.97 gal.

SCREEN LENGTH 10' DRILLING WATER LOSS 575 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
1537						
4/4 ~~1450~~	~5	1700	13.0	5.72		very Turbid
4/4 1540	25	1650?	12.6	5.57	8.0' to water	
1542	50	920	12.5	5.57		
1544	70	920	12.6	5.58	8.2' to water	
1545	90	920	12.7	5.58		
1546	115	930	12.6	5.58		
1548	150	940	12.6	5.58		water beginning
1550	180	940	12.8	5.57		to clear @ 140 gallons
1552	200	940	12.6	5.53		
1620	250	960	12.7	5.59		Resumed pumping after discharging water
1623	300	950	12.7	5.59		
1627	350	950	12.5	5.59		water level at 8.0' below PVC
1631	400	960	12.6	5.59		
1800	450	960	12.6	5.55		
	450	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Used a gas operated centrifigul pump with 1" black poly Tubing lowered to the well bottom. Tubing surged during development

NOTES: Water level meter probe continuously in well. Water level did n't fluctuate substantially.

WELL DEVELOPMENT FIELD RECORD

JOB NAME INDUSTRI PLEX JOB NO. 893-10255 WELL NO. CW4BA

DEVELOPED BY STEPHEN A. WHEELER DATE OF INSTALL 3/25-26/91 SHEET 1 OF 1

STARTED DEVEL. 4/4/91 (DATE) / 1450 (TIME) COMPLETED DEVEL. 4/4/91 (DATE) / 1512 (TIME)

W.L. BEFORE DEVEL. 7.31 (DEPTH) / 4/4/91 (DATE) / 12:00 (TIME) AFTER DEVEL. 7.80 (DEPTH) / 4/4/91 (DATE) / 1512 (TIME)

WELL DEPTH: BEFORE DEVEL. 26.14.5 ~~8~~ AFTER DEVEL. _____ WELL DIA. (In) 4"

STANDING WATER COLUMN (FT.) 18.69 STANDING WELL VOLUME 12.19 gal.

SCREEN LENGTH 10ft. DRILLING WATER LOSS 125 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/4 1450	~5	21000	14.1	5.73		DARK VERY TURBID
4/4 1452	30	20000	13.3	5.70		SAMPLE DARK LESS TURBID
4/4 1454	70	1800	12.8	5.62		SAMPLE CLOUDY
4/4 1456	90	1750	12.9	5.41		SAMPLE CLEAR
4/4 1459	125	1750	12.9	5.34		SURGED SAMPLE CLOUDY
4/4 1500	150	1800	12.8	5.30		SAMPLE CLEAR
4/4 1503	190	1800	12.8	5.23		SAMPLE CLEAR
4/4 1504	210	1800	12.6	5.21	WL 8.05	SAMPLE CLEAR
4/4 1508					7.90	WELL RECOVERS
4/4 1510					7.85	INSTANTLY
4/4 1512					7.80	
1530	215	1800	13.5	5.32	—	clear water
1532	215	1800	13.6	5.33	—	clear water.
	215	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: THE WELL WAS DEVELOPED UTILIZING A CENTRIFUGAL PUMP WITH BLACK POLYPROPYLENE ATTACHED AND INSERTED TO THE BASE OF THE WELL. 215 GALS WERE REMOVED AND FIELD PARAMETERS WERE ANALYZED PERIODICALLY THROUGHOUT THE DEVELOPMENT.

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Industriplex Woburn MA JOB NO. 893 6255 WELL NO. OW-49A

DEVELOPED BY DSL DATE OF INSTALL 4/12-15/91 SHEET ___ OF ___

STARTED DEVEL. 4/16/91 / 1130 (DATE / TIME) COMPLETED DEVEL. 4/16/91 / 1350 (DATE / TIME)

W.L. BEFORE DEVEL. 10.14' / 4/16/91 / 1130 (DEPTH / DATE / TIME) AFTER DEVEL. ~~9.6~~ / 4/16/91 / — (DEPTH / DATE / TIME)

WELL DEPTH: BEFORE DEVEL. 27.5 AFTER DEVEL. 27.5 WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) 17.36 STANDING WELL VOLUME 11.3 gal.

SCREEN LENGTH 10' DRILLING WATER LOSS — gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/16/91/1130	20	1650	16.2	5.95		Very turbid
1335	120	1400	14.3	5.90		Turbid
1350	90	1300	14.6	5.89		Turbid
	250	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Developed using centrifugal pump

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME: INDUSTRIPLEX WOBURN MA JOB NO. 893 6255 WELL NO. OW 50

DEVELOPED BY: DSL SW DATE OF INSTALL. ______ SHEET 2 OF 3.

STARTED DEVEL. 4/15/91 / ____ (DATE / TIME) COMPLETED DEVEL. 4/17/91 / 1649 (DATE / TIME)

W.L. BEFORE DEVEL. 13.10 / 4/15/91 / 1445 (DEPTH / DATE / TIME) AFTER DEVEL. — / — / — (DEPTH / DATE / TIME)

WELL DEPTH: BEFORE DEVEL. 51.5 AFTER DEVEL. 51.5' WELL DIA. (in) 4"

STANDING WATER COLUMN (FT.) — STANDING WELL VOLUME — gal.

SCREEN LENGTH 10' DRILLING WATER LOSS 2325 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS: SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/16/91/0825	70	2440	13.7	6.39		OW 50 slightly turbid
1010	~~100~~ 230	2200	15.7	6.20		slightly turbid
1020	50	2275	14.7	6.18		turbid
1030	40	2290	15.5	6.14		slightly turbid
1046	30	2210	14.6	5.99		slightly turbid.
1115	40	2700	14.8	5.95		turbid
1315	40	2400	14.9	5.90		slightly turbid
1430	—	—	—	—	—	W.L. @ 13.08'
4/17/91 1150					DTW 13.1	
4/17/91 1154	5	2700	10.9	5.79		BEGAN PUMPING WATER CLEAR W/SLIGHT RED
4/17/91 1158	45	2800	10.6	5.71		WATER CLEAR
4/17/91 1345	60	pumped	with	both	cent. & subm.	ATTEMPTED USE OF A CENT. PUMP
4/17/91 1404	5	2800	12.1	5.83		VERY TURBID
4/17/91 1415	55	2800	12.5	5.86		VERY TURBID
	670	= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Sc

NOTES: ~~removed 670 gallons on 4/~~

WELL DEVELOPMENT FIELD RECORD

JOB NAME ISRT JOB NO. 893-6255.37 WELL NO. OW-50A

DEVELOPED BY Mike Zarenski / S. Wheeler DATE OF INSTALL ~~4/12-4/15~~ 4/12-15/91 SHEET 1 OF 1

STARTED DEVEL. 4/15/91 / 1525 (DATE / TIME) COMPLETED DEVEL. 4/15/91 / 1550 (DATE / TIME)

W.L. BEFORE DEVEL. 12.70 / 4/15/91 / 1520 (DEPTH / DATE / TIME) AFTER DEVEL. — / — / — (DEPTH / DATE / TIME)

WELL DEPTH: BEFORE DEVEL. ______ AFTER DEVEL. ______ WELL DIA. (in) ______

STANDING WATER COLUMN (FT.) ______ STANDING WELL VOLUME ______ gal.

SCREEN LENGTH ______ DRILLING WATER LOSS 125 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS SPEC. COND. (umhos/cm)	TEMP. (C°)	pH (s.u.)	OTHER	REMARKS
4/15/91						
1525	1	1600	12.9	6.74		
1530	40					
1535	60	1600	10.8	5.47		Slightly Turbid
1545	117	1800	10.4	5.50		Clear
1550	180	1800	10.7	5.46		
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Well Developed using ~~Watera foot~~ Centrifigul Pump and Polyethylene Tubing

NOTES:

APPENDIX E

Chain of Custody Forms

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6442

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RI (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-144 (Source Code (from below) / Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 1450 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONL	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D S Ley
   Date: 4/17/91 Time: 1450 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 301

4. Shuttle Sealed By (print) DAVID S. LEY Date: 4/17/91 Time: 1530
   Signature: D S Ley Seal #: 189342 Intact: Y

LAB USE ONLY Opened By: A. Wheeler Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6 SEAL # 189342 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189349 ETC Job # CA6445

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-112 (Source Code (from below); Your Sample Point ID (left justify)) 91/04/18 (Start Date (YY/MM/DD)) 0940 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

#	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
	MET	1000	HNO3	METALS •	Y	.45 Micron	✓
1	CONS	125	H2SO4	TOC/COD •	Y	Filter Used	✓ more pres added at ETC 4/19/91
	CONS	1000	H2SO4	NH3/TKN •	Y		✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/18/91 Time: 1638
   Signature: Michael Zarenski Seal #: 189349 Intact: Y

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature: 303
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/18/91 Time: 1605
Signature: Seal #: 189350 Intact: Y

LAB USE ONLY Opened By: Date: 4/19/91 Time: 940
SHUTTLE # 113 TEMP. °C 4° SEAL # 189350 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189349 ETC Job # CA6446

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: INTERSECTION OF CONNECTOR RD. & ATLANTIC AVENUE, WOBURN, MA Phone: (617) 938 - 0530

Address:

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-42 (Source Code / Your Sample Point ID) 91/04/18 (Start Date YY/MM/DD) 0850 (Start Time 2400 hr. clock) (Elapsed Hours composite)

Source Codes:
(W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other (X)
(S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

#	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS •	Y	.45 MICRON	✓
	CONS	125	H2SO4	TOC/COD •	Y	FILTER USED	✓
	CONS	1000	H2SO4	NH3/TKN •	Y		✓ More pres added at ETC 4/9
	CONL	125	NONE	SOLIDS/TD •	N		✓
	UTB	40	GC/MS	TEMPERATURE •			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike zarenski Date: 4/8/91 Time: 1638
   Signature: mike zarenski Seal #: 189349 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 305

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/10/91 Time: 1005
   Signature: mike zarenski Seal #: 189350 Intact: Y

LAB USE ONLY Opened By: [illegible] Date: 4/10/91 Time: 940

SHUTTLE # 1131 TEMP. °C 4° SEAL # 189350 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6472

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0330

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-141 (Source Code (from below) / Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1450 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys....(C) Other ..... (X)

Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility .....(T) Lake/Ocean ..... (L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D.Stirling Ley
   Date: 4/17/91 Time: 1450 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 307

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1536
   Signature: D.Stirling Ley Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: A. Stender Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6 SEAL # 189342 COND. Intact

LTC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189349 ETC Job # CA6476

Date Sealed 91/04/05 By: MM

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: INTERSECTION OF COMMERCE WAY & Phone: (617) 938 - 0530

Address: ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-42 (Source Code (from below), Your Sample Point ID (left justify)) 91/04/18 (Start Date (YY/MM/DD)) 0850 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean.....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No.	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) MIKE ZARENSKI Date: 4/8/91 Time: 1638
   Signature: Michael Zarenski Seal #: 189 349 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 309

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1905
   Signature: Michael Zarenski Seal #: 189350 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/19/91 Time: 949

SHUTTLE # 1131 TEMP. °C 40 SEAL # 189350 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6563

Sample Point W | OW-150
Source Code | Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910417	1345	31.3	24	1100 →Dry

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: NA — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y (N) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): ______

Well Depth (ft): 50.00

Depth to Ground water (ft): 13.10

Sample Depth (non-well) (ft): ______

Groundwater Elevation (ft msl): ______

	ph (STD)	spec. cond. (um/cm at 25°C)	other parameter	value	units
1st	5.71	2700	EH	82 (75)	mV
2nd	5.73	2700	EH	83 (75)	mV
3rd					
4th					

Sample Temp: 9.6 (°C)

Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Slight reddish tinge no odor

Weather Conditions: Cloudy, 45°F, Wind 5-10mph NE.

Other: Purge vol = (3)(36.90)(0.652) 0.652 gal/ft 4" casing
= 72.18

Well Purged dry, Aprox 1500 gallons removed over 2 days of development

NB Well purged at time of development

Well not surveyed at time of sampling.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): MIKE ZARENSKI   Employer: GOLDER ASSOC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date)   Michael Zarenski (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6564

Sample Point [W] [0 W-4 9 A] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
9 1 0 4 1 8	0 8 1 3	1.2	1 1.1 2 4	1 1 6 4

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Depth to Ground water (ft) 1 0.2 6

Groundwater Elevation (ft msl)

Well Depth (ft) 2 7.5

Sample Depth (non-well) (ft)

	ph		spec. cond.		(other parameter)	value	units
1st	6.4 6 (STD)	1st	8 3 0	um/cm at 25°C	EH	5 7	mV
2nd	6.4 5 (STD)	2nd	8 3 0	um/cm at 25°C	EH	5 7	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 1 0.3 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slightly turbid, no odor

Weather Conditions: Cloudy, 45°F, Winds 5-10mph NE

Other: Purge vol = (3)(17.24)(0.652) = 33.72 gals. 0.652 gal/ft 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) MIKE ZARENSKI Employer: GOLDER ASSOC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) (Signature)

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ORIGINAL

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Seal No. 0192415 ETC Job # CA6566

Date Sealed 91/04/16 By: MA

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 1553

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVE., WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0 W-1 4 9 A (Source Code (from below); Your Sample Point ID (left justify)) 91 04 18 (Start Date (YY/MM/DD)) 1110 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/18/91 Time: 1630
Signature: Michael Zarenski Seal #: 192415 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

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4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1240
Signature: Michael Zarenski Seal #: 192416 Intact: Y

LAB USE ONLY Opened By: [illegible] Date: 4/19/91 Time: 930
SHUTTLE # 621 TEMP. °C 7° SEAL # 192416 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # ~~CA6489~~ CA6593 4/19/91

Sample Point [X] (Source Code) [B12E0B] (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N]

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Depth to Ground water (ft)

Groundwater Elevation (ft msl)

Well Depth (ft)

Sample Depth (non-well) (ft)

	ph	(STD)	spec. cond.	um/cm at 25°C	(other parameter)	value	units
1st	6.50	(STD)	1st 11.6	um/cm at 25°C	Eh	177	mV
2nd	6.37	(STD)	2nd 11.6	um/cm at 25°C	Eh	177	mV
3rd		(STD)	3rd	um/cm at 25°C			
4th		(STD)	4th	um/cm at 25°C			

Sample Temp: 14.4 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Clear, no odor

Weather Conditions: Cloudy, slight breeze, 45°F

Other:

distilled water transferred from 5 gallon nalgene container into bailer then to bottles filtered samples filtered using transfer vessel used for all other wells

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) Michael Zarenski (Signature)

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ORIGINAL

LTC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1)

ORIGINAL

Seal No. 189319 ETC Job # CA6432

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-DW-47 (Source Code (from below), Your Sample Point ID (left justify)) 910416 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
	MET	1000	HNO3	METALS •	Y	QED WITH 4S	✓
1	CONS	125	H2SO4	TOC/COD •	Y	MICRON IN-LINE	✓
	CONS	1000	H2SO4	NH3/TKN •	Y	FILTER (Model# FF8200)	✓
	CONU	125	NONE	SOLIDS/TD •	N		✓
1	UTB	40	GC/MS	TEMPERATURE Bottle missing when shuttle was checked in.			X

CHAIN OF CUSTODY CHRONICLE

Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1647

Signature: Michael Zarenski Seal #: 189319 Intact: Y

1. I have received these materials in good condition from the above person.

Name: Signature:

Date: Time: Remarks:

2. I have received these materials in good condition from the above person.

Name: Signature: 341

Date: Time: Remarks:

Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/16 Time: 1450

Signature: Michael Zarenski Seal #: 189320 Intact: Yes

LAB USE ONLY Opened By: A. Stanton Date: 4/19/91 Time: 1245

SHUTTLE # 694 TEMP. °C 2 SEAL # 189320 COND. Good

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6433

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-0W-413 (Source Code (from below) / Your Sample Point ID (left justify)) 910416 (Start Date (YY/MM/DD)) 1130 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	.45 micron	✓
1	CONS	125	H2SO4	TOC/COD •	Y	In line filter	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	used QED	✓
1	CONU	125	NONE	SOLIDS/TD •	N	model EF820	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1051
   Signature: Michael Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature: 343
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1500
   Signature: Michael Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1220

SHUTTLE # 42 TEMP. °C 6° SEAL # 189318 COND. Intact

mw 4/17/91

ETC Environmental Testing and Certification Corp.

ORIGINAL

C IAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6434

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-137 | 91/04/16 | 1200 |
Source Code (from below) | Your Sample Point ID (left justify) | Start Date (YY/MM/DD) | Start Time (2400 hr. clock) | Elapsed Hours (composite)

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

#	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS	Y	QED Inline	✓
	CONS	125	H2SO4	TOC/COD	Y	filter	✓
1	CONS	1000	H2SO4	NH3/TKN	Y	model	✓
	CONO	125	NONE	SOLIDS/TD	Y	FF-8200	✓
	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened	/	used	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1051
Signature: Michael O Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

345

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1500
Signature: Michael O Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: [illegible signature] Date: 4/17/91 Time: 1220
SHUTTLE # 42 TEMP. °C 6 SEAL # 189318 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 189313 ETC Job # CA6435

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIISRT (Facility/Site Code) (Optional Sample Point Description)

Sample Point: WOW-22 (Source Code (from below), Your Sample Point ID (left justify)) 910411 (Start Date (YY/MM/DD)) 1230 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	QED with .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	micron in-line	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	filter used	✓ Acid Broken
1	CONU	125	NONE	SOLIDS/TD ✓	N	(Model FF800)	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1349
   Signature: Stephen A. Wheeler Seal #: 0189313 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature: 347
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1605
   Signature: Stephen A. Wheeler Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1235

SHUTTLE # 307 TEMP. °C 6 SEAL # 189314 COND. Intact

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Seal No. 189313 ETC Job # CA6436

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDSRT (Facility/Site Code)

Sample Point: W-OW-150A (Source Code (from below)) 910411 (Your Sample Point ID (Optional)) 910411 (Start Date (YY/MM/DD)) 1520 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS ✓	Y	QED with .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	micron filter used	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	(Model PE B300)	✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING FROM SHUTTLE			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1349
   Signature: Stephen A. Wheeler Seal #: 989313 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 349

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1605
   Signature: Stephen A. Wheeler Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1239

SHUTTLE # 307 TEMP. °C 6 SEAL # 189314 COND. Sealed

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1)

ORIGINAL

Seal No. 189345 ETC Job # CA6438

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: _____ Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|E|S|R|T| (Facility/Site Code) _____ (Optional Sample Point Descriptions)

Sample Point: W-01M-118 (Source Code (from below) / Your Sample Point ID (left justify)) | 91/04/17 (Start Date (YY/MM/DD)) | 12/11 (Start Time (2400 hr. clock)) | _____ (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNU3	METALS ✓	Y	.45 MICRONS	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FIELD FILTER	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	USED	✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1335
   Signature: Stephen A Wheeler Seal #: 189345 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Mike Zarenski Signature: Michael Zarenski
   Date: 4/17/91 Time: 1200 Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 351

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1250
   Signature: Michael Zarenski Seal #: 189346 Intact: Y

LAB USE ONLY Opened By: A. Stessler Date: 4/18/91 Time: 943

SHUTTLE # 182 TEMP. °C 5 SEAL # 189346 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189343 ETC Job # CA6439

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDSRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MOW-1BA (Source Code (from below); Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 1000 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNU3	METALS •	Y	USED .45 micron	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FIELD FILTER	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y		✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1717
   Signature: mike O - Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature: 353
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/17/91 Time: 1055
   Signature: mike O Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: A. Stepler Date: 4/18/91 Time: 955

SHUTTLE # 836 TEMP. °C 6° SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189343 ETC Job # ~~CA6440~~ CA6439

Date Sealed 91/04/05 By: MW mw 4/18/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDSRT (Facility/Site Code) ~~Dupl~~ Matrix Spike (Optional Sample Point Description)

Sample Point: X-GW-118AMS (Source Code (from below) / Your Sample Point ID (left justify)) 911/04/17 (Start Date (YY/MM/DD)) 1013 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	In line	✓
1	CONS	125	H2SO4	TOC/COD •	Y	filter	N
1	CONS	1000	H2SO4	NH3/TKN •	Y	used	✓
1	CONU	125	NONE	SOLIDS/TD •	N	.45 micron	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened	✓		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1717
   Signature: Mike Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 355

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1055
   Signature: Mike Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: A. Stoppler Date: 4/18/91 Time: 955

SHUTTLE # 836 TEMP. °C 6° SEAL # 189394 COND. Intact

ETC and Certification Corp. ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 187345 ETC Job # ~~CA0457~~ CA0439

Date Sealed 4/04/05 By: MW

4/12/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDSIRTI (Facility/Site Code) Matrix Spike Duplicate (Optional Sample Point Descriptions)

Sample Point: X-GW1-118A1MS101 (Source Code (from below) / Your Sample Point ID (left justify)) 910407 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	.45 micron	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	Filtered	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1335
   Signature: Stephen A. Wheeler Seal #: 0189345 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Mike Zarenski Signature: Michael Zarenski
   Date: 4/12/91 Time: 1100 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 357

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1250
   Signature: Michael Zarenski Seal #: 189346 Intact: Y

LAB USE ONLY Opened By: Date: 4/18/91 Time: 945

SHUTTLE # 182 TEMP. °C 3 SEAL # 189346 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6441

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R I (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0 W-45 (Source Code (from below) / Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 14/15 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys ...(C) Other ..... (X)

Soil ..(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE					SAMPLER		LAB
No	Type	Size	Preserv.	ANALYSIS	FIIL (Y/N)	Observations	Observations
1	MET	1000	HNU3	METALS ✓	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D. Stringfellow
   Date: 4/17/91 Time: 1415 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 359

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1536
   Signature: D. Stringfellow Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 1090

SHUTTLE # 1183 TEMP. °C 6° SEAL # 189342 COND. Locked

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 107221 ETC Job # CA6443

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIST (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-49 (Source Code (from below); Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1630 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys ....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y		✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1059
   Signature: Michael Zarenski Seal #: 189351 Intact: Y
2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____
3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 361
4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
   Signature: Michael Zarenski Seal #: 189352 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/18/91 Time: 955

SHUTTLE # 0 TEMP. °C 5 SEAL # 189352 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189351 ETC Job # CR6444

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIST (Facility/Site Code) DUPLICATE (Optional Sample Point Descriptions)

Sample Point: K-0W-1491041F (Source Code (from below) / Your Sample Point ID (left justify)) 911041 17 (Start Date (YY/MM/DD)) 161310 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	.45 micron	✓
1	CONS	125	H2SO4	TOC/COD •	Y	In line	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	filter	✓
1	CONU	125	NONE	SOLIDS/TD •	N	used	✓
1	UTB	40	GC/MS	TEMPERATURE •			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1059
   Signature: michael Zarenski Seal #: 189351 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 363

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
   Signature: michael Zarenski Seal #: 189352 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 955

SHUTTLE # 0 TEMP. °C 5 SEAL # 189952 COND. Intact

FTC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189319 ETC Job # CA6462

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDINDUSTRI (Facility/Site Code) (Optional Sample Point Description)

Sample Point: W-OW-47 (Source Code (from below)) (Your Sample Point ID (left justify)) 910411 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1647
Signature: mchael Zarenski Seal #: 189319 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature: 365
Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1450
Signature: Seal #: 189320 Intact: YES

LAB USE ONLY Opened By: Date: 4/17/91 Time: Overnight

SHUTTLE # 694 TEMP. °C 6 SEAL # 189320 COND. 1245

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6464

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-37 (Source Code (from below) / Your Sample Point ID (left justify)) 910411 (Start Date (YY/MM/DD)) 1120 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil...(S) River/Stream..(R) Generation Point....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1.	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1051

Signature: Michael Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.

Name: Signature:

Date: Time: Remarks:

3. I have received these materials in good condition from the above person.

Name: Signature:

Date: Time: Remarks: 367

4. Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/11 Time: 1500

Signature: Michael Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: A. Stepler Date: 4/9/91 Time: 1220

SHUTTLE # 42 TEMP. °C 6 SEAL # 189313 COND Intact

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1)

ORIGINAL

Seal No. 189313 ETC Job # CA6466

Date Sealed 91/04/05 By: SW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-0W-150A | 910411 | 1520 |

Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr clock)	Elapsed Hours (composite)
W	0W-150A	910411	1520	

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A WHEELER Date: 910409 Time: 1345
   Signature: Stephen A. Wheeler Seal #: 0189313 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 369

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/11 Time: 1605
   Signature: Stephen A. Wheeler Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: D. Blanchard Date: 4/17/91 Time: 1230

SHUTTLE # 307 TEMP/C 6 SEAL # 189314 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 101343 ETC Job # CA6469

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W|-|O|W|-|1|8|A| (Source Code (from below) / Your Sample Point ID (left justify)) | 9|1|0|4|1|7| (Start Date (YY/MM/DD)) | 1|0|0|0| (Start Time (2400 hr clock)) | | (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1717
   Signature: Michael Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 371

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1055
   Signature: Michael Zarenski Seal #: 189341 Intact: Y

LAB USE ONLY Opened By: D. Stesler Date: 4/18/91 Time: 933

SHUTTLE # 836 TEMP. °C 6° SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 187343 ETC Job # ~~CA6470~~ CA6469

Date Sealed 91/04/05 By: MW

Mc 4/18/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) Matrix Spike (Optional Sample Point Descriptions)

Sample Point: X (Source Code (from below)) - OW-118AMS (Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1030 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys ....(C) Other ....(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1717
Signature: Michael Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks: 372

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1955
Signature: Michael Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: A. Stefola Date: 4/18/91 Time: 935

SHUTTLE # 836 TEMP. °C 6 SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 189341 ETC Job # CA6471

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code)

(Optional Sample Point Description)

Sample Point: W - O W - 1 5 (Source Code (from below); Your Sample Point ID (left justify))

9 1 0 4 1 7 (Start Date (YY/MM/DD))

1 4 1 5 (Start Time (2400 hr. clock))

(Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		/

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D. Stirling Ley
   Date: 4/17/91 Time: 1425 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 374

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1536
   Signature: D. Stirling Ley Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6° SEAL # 189342 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189351 ETC Job # CA6474

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIST (Facility/Site Code) DUPLICATE (Optional Sample Point Descriptions)

Sample Point: X-0MW-49DUP (Source Code (from below) / Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 1630 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNU3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1059
   Signature: Michael Zarenski Seal #: 189361 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 376

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
   Signature: Michael Zarenski Seal #: 189352 Intact: YES

LAB USE ONLY Opened By: A. Stabler Date: 4/18/91 Time: 955

SHUTTLE # 0 TEMP. °C 5 SEAL # 189352 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6592

Sample Point [W] [~~OWI-22~~] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

OW-22 NA 4/25/91

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910418	~~0813~~ 0906		11.12	15 -> Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [D] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [/] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)	818.80	Well Depth (ft)	16.64
Depth to Ground water (ft)	9.00	Sample Depth (non-well) (ft)	
Groundwater Elevation (ft msl)	7.28.80		

VALUES ARE CORRECT 10% INT

	ph	spec. cond.	(other parameter)	value	units
1st	6.81 (STD)	2100 um/cm at 25°C	EH	166	mV
2nd	6.81 (STD)	2100 um/cm at 25°C	EH	166	mV
3rd	(STD)	um/cm at 25°C			
4th	(STD)	um/cm at 25°C			

Sample Temp: 8.3 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slightly Turbid, no odor

Weather Conditions: Cloudy, 45°F Slight wind

Other: .163 gal/ft 2" casing

Purge Vol = (16.64 - 9.0)(.163)(3) = 4.0

well purged dry @ 5.0 gallons.

This is a re-sampling due to broken bottles

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) Mike Zarenski (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # ~~CA6448~~ CA 6673

Sample Point: W | OW-1501A

Source Code: 0L | Sample Point I.D.

4/25/91

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910418	1655		12	36

SAMPLING METHOD:

Sampler Type: X — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other: watera (SPECIFY OTHER)

Sampler Material: X — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other: Polyethylene (SPECIFY OTHER)

Tubing Material: C — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other: (SPECIFY OTHER)

Sample Composited: Y/N (N circled)

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): * [blank]

Well Depth (ft): 30.26

Depth to Ground water (ft): 12.87

Sample Depth (non-well) (ft): [blank]

Groundwater Elevation (ft msl): [blank]

	ph (STD)		spec. cond. (umho/cm at 25°C)	other parameter	value	units
1st	5.84	1st	1200	Eh	51	mV
2nd	5.86	2nd	1200	Eh	51	mV
3rd		3rd				
4th		4th				

Sample Temp: 9.5 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Yellowish, no odor

Weather Conditions: Partly Sunny, 45°F Slight breeze

Other:
Purge Volume = (30.26 − 12.87) (.652)(3) = 34
* well not surveyed information not available
.652 gal/ft 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4 (Date) Michael Zarenski (Signature)

380

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6420

Sample Point W | OW11A
Source Code / Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910411	1219	~~---~~	27.02	98.0

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: N/A — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y/(N) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): 65.54

Well Depth (ft): 48.50

Depth to Ground water (ft): 7.06

Sample Depth (non-well) (ft): ______

Groundwater Elevation (ft msl): ~~64.44~~ SAW/910412 58.48

	ph (STD)		spec. cond. (umhos/cm at 25°C)	(other parameter)	value	units
1st	6.45	1st	680	EH	306	mV
2nd	6.44	2nd	680	EH	304	mV
3rd		3rd				
4th		4th				

Sample Temp: 11.2 (°C)   Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: CLEAR SOME REDDISH BROWN MATTER

Weather Conditions: SUNNY SLIGHT BREEZE ~50°F

Other:

PURGE CALC: DEPTH OF WELL - DEPTH TO WATER x .652 (gal/ft of 4" casing) x 3 = PURGE VOL.

48.50 - 7.06 = 41.44 x .652 x 3 = 81.06

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print)   Employer: GOLDER ASSOC. INC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

91/04/12 (Date)   [signature] (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6421

Sample Point W (Source Code) OW17 (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910410	1415	1.3	113	40

SAMPLING METHOD:

Sampler Type [E] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N] (Procedure/Proportions)

FIELD MEASUREMENTS

Well Elevation (ft/msl) 578.6

Depth to Ground water (ft) 61.8

Groundwater Elevation (ft msl) 516.8

Well Depth (ft) 263.2

Sample Depth (non-well) (ft)

	ph	(STD)		spec. cond.	um/cm at 25°C	(other parameter)	value	units
1st	6.75		1st	7850		EH	-316	mv
2nd	6.77		2nd	7850		EH	-321	mv
3rd			3rd					
4th			4th					

Sample Temp 15.4 (°C)

Turbidity NTU

FIELD COMMENTS

Sample Appearance: Brownish color strong odor

Weather Conditions: Sunny 65°F 10 mph winds

Other: Purge Vol = (26.32 - 6.18)(.652)(3) = 39.4

OW17 is 4" diameter PVC well purged using dedicated 1" Brady Valve on the end of Polyethylene Tubing

Began sampling at 0815 and stopped at 0900 ~~[illegible]~~ returned To finish sampling @ 1230

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) Mike Zaremski Employer: Golder

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols. 5/16

4/11/91 (Date) Michael Zaremski (Signature)

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CAH22

Sample Point [W] [EQB] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (2400 Hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ____ (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ____ (SPECIFY OTHER)

Tubing Material [ ] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ____ (SPECIFY OTHER)

Sample Composited [Y/N] ____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)
Depth to Ground water (ft)
Groundwater Elevation (ft msl)
Well Depth (ft)
Sample Depth (non-well) (ft)

	ph		spec. cond.		(other parameter)	value	units
1st	5.94 (STD)	1st	150	um/cm at 25°C	EH	234	mv
2nd	5.95 (STD)	2nd	150	um/cm at 25°C	EH	224	mv
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 20.5 (°C)
Turbidity: NTU

FIELD COMMENTS

Sample Appearance: clear, no odor
Weather Conditions: Sunny, 65°F 40 mph winds
Other: Equipment blank performed at CW17, Purchased distilled water was run through a disposable Bailer then transferred to bottles, for filtered Parameters water was transferred from bailer to filtering vessel and filtered

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: mike Zarenski (Print) Employer: Golder

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/11/91 (Date) (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6423

Sample Point [W] [0W38] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910411	1540		16.16	212.50

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [N/A] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/(N)] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)	714.0	Well Depth (ft)	117.10
Depth to Ground water (ft)	69.93	Sample Depth (non-well) (ft)	
Groundwater Elevation (ft msl)	644.17		

	ph		spec. cond.		(other parameter)	value	units
1st	6.49 (STD)	1st	810	um/cm at 25°C	EH	412	mV
2nd	6.50 (STD)	2nd	820	um/cm at 25°C	EH	413	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 8.3 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: REDDISH BROWN, SUSPENDED MATTER

Weather Conditions: SUNNY, VERY WINDY, 40° F

Other: PURGE VOLUME CALC. - WELL DEPTH - DEPTH TO WATER x .652 x 3

17.10 - 6.93 = 10.17 x .652 x 3 = 19.89

.652 gal / ft of 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC INC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

910412 (Date) Stephen A. Wheeler (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6424

Sample Point: W | 10W418 (Source Code / Sample Point I.D.)

FIELD PROCEDURES

910411	1413		24.97	90.0
PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material: N/A — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited: Y (N) — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Well Depth (ft) 46.0

Depth to Ground water (ft) 7.70

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl) *

	ph (STD)	spec. cond. (um/cm at 25° C)	other parameter	value	units
1st	5.84	1200	EH	176	mV
2nd	5.85	1200	EH	175	mV
3rd					
4th					

Sample Temp 17.6 (°C)

Turbidity NTU

FIELD COMMENTS

Sample Appearance: Cloudy, some suspended particles

Weather Conditions: Sunny, very windy, cold 40°F

Other: Purge vol calc – well depth – depth to water x .652 (gal/ft of 4" casing) x 3 = 46.0 – 7.7 = 38.30 x .652 x 3 = 74.91

Well elevation not surveyed, elevation unknown.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): Stephen A. Wheeler Employer: Golder Assoc Inc

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

910412 (Date) [signature] (Signature)

322

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6425

Sample Point [W] [01W48IA] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
91 10 A 11	1450	1	12.15	40.10

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [N/A] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/(N)] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Depth to Ground water (ft) 7.31

Groundwater Elevation (ft msl)

Well Depth (ft) 26.50

Sample Depth (non-well) (ft)

* WELL NOT SURVEYED INFORMATION UNAVAILABLE

	ph		spec. cond.		(other parameter)	value	units
1st	5.63 (STD)	1st	2250	um/cm at 25°C	EH	257	mV
2nd	5.63 (STD)	2nd	2250	um/cm at 25°C	EH	256	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 17.4 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: CLOUDY

Weather Conditions: SUNNY VERY WINDY 40°F

Other:

PURGE VOL CALC = DEPTH OF WELL - DEPTH TO WATER x .652 (gal/ft of 4" casing) x 3 = PURGE VOLUMED

26.50 - 7.31 = 19.19 x .652 x 3 = 37.54

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

9/04/12 (Date) Stephen A. Wheeler (Signature)

ORIGINAL

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189325 ETC Job # ~~CA6426~~ CA6425

Date Sealed 91/04/05 By: WW ~~MZ~~ 4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) Matrix Spike (Optional Sample Point Descriptions)

Sample Point: X (Source Code (from below)) -OW48AMS (Your Sample Point ID (left justify)) 910412 (Start Date (YY/MM/DD)) 1025 (0945) MZ 4/16/91 (Start Time (2400 hr. clock)) - (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •		QED model	✓
1	CONS	125	H2SO4	TOC/COD •		FF 8200	✓
1	CONS	1000	H2SO4	NH3/TKN •		field Filter	✓
1	CONL	125	NONE	SOLIDS/TD •		used	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1706
Signature: Michael C Zaranski Seal #: 189325 Intact: ✓

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1116
Signature: Michael Zaranski Seal #: 189326 Intact: ✓

LAB USE ONLY Opened By: A. Stezoler Date: 4/15/91 Time: 1210 325
SHUTTLE # 59 TEMP. °C 6° SEAL # 189326 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 198997 ETC Job # ~~CA6419~~ CA6425

Date Sealed 91/04/05 By: MW

ma 4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GIOLIDIISIRITI (Facility/Site Code) MATRIX SPIKE DUPLICATE (Optional Sample Point Descriptions)

Sample Point: XHOWI4BIAIMSD1 (Source Code (from below), Your Sample Point ID (left justify)) 910104 (Start Date (YY/MM/DD)) 1015 (0945) (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

ma 4/16/91

Source Codes:

Well ..(W) Outfall..... (O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS •	Y	QED MODELL	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FF8300 WITH	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	.45MICRON FILTER	✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓
				Note: Seal # was			
				193997			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1109
   Signature: Michael Zarenski Seal #: 193997 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1400
   Signature: Michael Zarenski Seal #: 193998 Intact: Y

LAB USE ONLY Opened By: [signature] Date: 4/15/91 Time: 1249

SHUTTLE # 891 TEMP. °C 5 SEAL # 193998 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189323 ETC Job # CA6428

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W40 (Source Code (from below), Your Sample Point ID (left justify)) 910412 (Start Date (YY/MM/DD)) 1400 (Start Time (2400 hr. clock)) - (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS *	Y	QED WITH	✓
1	CONS	125	H2SO4	TOC/COD *	Y	.45 MICRON IN-	✓
1	CONS	1000	H2SO4	NH3/TKN *	Y	* LINE FILTER	✓
1	CONS	125	NONE	SOLIDS/TD *	N	(MODEL FF800)	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was checked in.			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1657
   Signature: Michael Zarenski Seal #: 189323 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1145
   Signature: Michael Zarenski Seal #: 189324 Intact: Y

LAB USE ONLY Opened By: Golder Date: 4/13/91 Time: 1230

FILE # 898 TEMP. °C 5° SEAL # 189324 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189321 ETC Job # CA6429

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA. 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RTI (Facility/Site Code) (Optional Sample Point Description)

Sample Point: W-OW1-116 (Source Code (from below) / Your Sample Point ID (left justify)) 911014 (Start Date (YY/MM/DD)) 0813 S (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Fill. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS ✓	Y	in line	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	filter,	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	QED model	✓
1	CONL	125	NONE	SOLIDS/TD ✓	N	FF 8200 used	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1113
   Signature: Stephen A. Wheeler Seal #: 0189321 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1455
   Signature: Stephen A. Wheeler Seal #: 189322 Intact: Yes

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1225

SHUTTLE # 1122 TEMP. °C 7 SEAL # 189322 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189321 ETC Job # CA6430

Date Sealed 91/04/09 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GLDLDISRTI (Facility/Site Code) Duplicate Sample (Optional Sample Point Descriptions)

Sample Point:	Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr. clock)	Elapsed Hours (composite)
	X	GW-146DUPL	910416	1815	

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS ✓	Y	Inline .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	filter	Recd with Gw drops
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	Model QED	✓
1	CONS	125	NONE	SOLIDS/TD ✓	N	FF 8200	Recd with a Gw drop
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED	—	used	

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A WHEELER Date: 910409 Time: 1113
   Signature: Stephen A. Wheeler Seal #: 0189321 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 9/04/09 Time: 1455
   Signature: Stephen A. Wheeler Seal #: 189322 Intact: YES 333

LAB USE ONLY Opened By: A. Stanley Date: 4/7/91 Time: 1225

SHUTTLE # 1122 TEMP. °C 7 SEAL # 189322 COND. Ambient

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189319 ETC Job # CA6431

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDDISRT (Facility/Site Code)

(Optional Sample Point Descriptions)

Sample Point: MW-19 (Your Sample Point ID, left justify) | 91/04/16 (Start Date YY/MM/DD) | 1013 (Start Time 2400 hr. clock) | (Elapsed Hours composite)

Source Code (from below)

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys. ..(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	QED with	✓
1	CONS	125	H2SO4	TOC/COD •	Y	45 MICRON IN-	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	LINE FILTER	✓
1	CONS	125	NONE	SOLIDS/TD •	N	(MODEL FF8300)	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1647
   Signature: Michael Zarenski Seal #: 189319 Intact: Y
2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:
3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:
4. Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/16 Time: 1450
   Signature: Michael Zarenski Seal #: 189320 Intact: YES

LAB USE ONLY Opened By: A. Stanley Date: 4/17/91 Time: 1245

SHUTTLE # 694 TEMP. °C 6 SEAL # 139320 COND. Iced 335

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 198997 ETC Job # CA6450

Date Sealed 91/04/09 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RT (Facility/Site Code) (Optional Sample Point Description)

Sample Point: MW-10W14 (Source Code (from below), Your Sample Point ID (left justify)) 910A12 (Start Date (YY/MM/DD)) 1330 (Start Time (2400 hr. clock)) - (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓
				Seal # on			
				shuttle was			
				193997			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1169
   Signature: Michael Zarenski Seal #: 193997 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1400
   Signature: Michael Zarenski Seal #: 193998 Intact: Y

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LAB USE ONLY Opened By: A. Bessler Date: 4/15/91 Time: 1249

SHUTTLE # 891 TEMP. °C 50 SEAL # 193998 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 193995 ETC Job # CA6452

Date Sealed 91/04/05 By: mw

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RT 1 (Facility/Site Code) Equipment Blank (Optional Sample Point Description)

Sample Point: X-OUTFALL (Source Code (from below)) (Your Sample Point ID (left justify)) 910404 (Start Date (YY/MM/DD)) 1010 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

04 11 mw 4/12/91

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE					SAMPLER		LAB
No	Type	Size	Preserv.	ANALYSIS	Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) JEANNE A. WHEELER Date: 910409 Time: 1125
   Signature: Jeanne A. Wheeler Seal #: 0193995 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Mike Zarenski Signature: Michael Zarenski
   Date: 4/11/91 Time: 0815 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/11/91 Time: 1645
   Signature: Michael Zarenski Seal #: 193995 Intact: Y

LAB USE ONLY Opened By: A. Wheeler Date: 4/12/91 Time: 1209

SHUTTLE # 631 TEMP °C 7.0 SEAL # 193996 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189315 ETC Job # CA6454

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDINSRI (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W418 (Source Code (from below); Your Sample Point ID (left justify)) 910412 (Start Date (YY/MM/DD)) 0920 (Start Time (2400 hr. clock)) - (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1628
   Signature: Michael Zarenski Seal #: 189315 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1015
   Signature: Michael Zarenski Seal #: 189316 Intact: Y

LAB USE ONLY Opened By: A. Blondin Date: 4/15/91 Time: 1200

SHUTTLE # 1134 TEMP. °C 5.0 SEAL # 189316 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189325 ETC Job # CA6456 CA6455

Date Sealed 91/04/05 By: WW mz 4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIISRIT (Facility/Site Code) Matrix Spike (Optional Sample Point Descriptions)

Sample Point: XWGW18AMS (Source Code (from below) / Your Sample Point ID (left justify)) 041291 (Start Date (YY/MM/DD)) 1025 (Start Time (2400 hr. clock)) (0945) mz 4/16/91 — (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	TOTAL METALS	N		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1705 mz 1706
   Signature: michael Zarenski Seal #: 189325 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1116
   Signature: michael Zarenski Seal #: 189326 Intact: Y

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LAB USE ONLY Opened By: A. Stegeler Date: 4/15/91 Time: 1210

SHUTTLE # 59 TEMP. °C 6° SEAL # 189326 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6429

Sample Point [W] [01W1-1416] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
911019	0914	15	16.13	17.0 -> Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y(N)] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Depth to Ground water (ft) 3.76

Groundwater Elevation (ft msl) *

Well Depth (ft) 13.5

Sample Depth (non-well) (ft)

FIELD PARAMETERS OBTAINED AFTER SAMPLING EVENT DUE TO EQUIPMENT PROBLEMS

	ph	(STD)	spec. cond.	um/cm at 25°C	(other parameter)	value	units
1st	6.81		1000		EH	87	mV
2nd	6.89		1000		EH	84	mV
3rd							
4th							

Sample Temp: 5.1 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slightly Turbid, no odor

Weather Conditions: Sunny, 50°F, calm

Other: well developed from 4/5/91 -> 4/12/91, 32 gallons removed

* Information not Available, well not surveyed.

4" diameter well = .652 gal/ft

Purge Volume = (13.5' - 3.76)(.652)(3) = 19.05 gallons

Well purged dry and was allowed to recover before Sampling

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) Mike Zarenski Employer: Golder Ass

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/16/91 (Date) Michael Zarenski (Signature) 332

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6430

Sample Point [X] (Source Code) OW-A16DUP1 (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910415	0915	~~1.1~~	16.13	17.0 → Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Depth to Ground water (ft) 3.76

Groundwater Elevation (ft msl) *

Well Depth (ft) 13.5

Sample Depth (non-well) (ft)

FIELD PARAMETERS OBTAINED AFTER SAMPLING EVENT DUE TO EQUIPMENT PROBLEMS

	ph	(STD)	spec. cond.	um/cm at 25°C	(other parameter)	value	units
1st	10.13		1810		EH	130	mV
2nd	10.11		1800		EH	129	mV
3rd							
4th							

Sample Temp: 18.4 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slightly Turbid, no oder

Weather Conditions: Sunny, 50°F Calm

Other: This is a duplicate sample from OW-46 taken immediately after sampling of OW-46 using the same filter, bailer and filtering device.

Purge Volume = (13.5 - 3.76)(.652)(3) = 19.05 gallons

Well Purged dry after 7.0 gallons

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Ass

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/16/91 Michael Zarenski (Date) (Signature)

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6431

Sample Point W | 0W-9
Source Code / Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910415	1055	--	168	310 -> Dry

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: N/A — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y / (N) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): 688.8
Depth to Ground water (ft): 95.9
Groundwater Elevation (ft msl): 592.9
Well Depth (ft): 128.94
Sample Depth (non-well) (ft): ______

	ph (STD)	spec. cond. (umhos/cm at 25°C)	other parameter	value	units
1st	7.64	980	EH	157	mV
2nd	7.61	980	EH	158	mV
3rd					
4th					

Sample Temp: 91.0 (°C) 3 [illegible]
Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Reddish Color, slight odor

Weather Conditions: SUNNY, SLIGHT BREEZE, ~ 55°F

Other: field Parameters recorded after sampling due to meter Problems

7.48 gallons / ft³
h = water column

Purge Volume = $\pi r^2 h \cdot 7.48$ = 168 gallons

Well purged dry @ 310 gallons

Purged with Submersible Pump

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): STEPHEN A. WHEELER   Employer: GOLDER ASSOC. INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

91/04/16 (Date)   [signature] (Signature)

ORIGINAL

APPENDIX F

CLP Data Validation Narrative

INDUSTRI-PLEX SITE
ARSENIC PIT/CHROMIUM LAGOON
GROUNDWATER INVESTIGATION

CLP Data Validation Narrative

1.0 INTRODUCTION

Golder Associates Inc. (Golder) has performed a data validation of the Inorganic analytical data from the observation well samples collected from April 11 through 18, 1991 at the Industri-Plex Site in Woburn, Massachusetts. These samples were collected for the Arsenic Pit/Chromium Lagoon Groundwater Investigation conducted as part of the Pre-Design Investigation (PDI) at the Site. The samples were analyzed for the Metals portion of the Inorganic Target Analyte List (TAL) in accordance with the Contract Laboratory Program (CLP) Inorganic Statement of Work (SOW) dated 7/88. The analyses were performed by Environmental Testing and Certification (ETC) Corp. of Edison, New Jersey (referred to as Laboratory). Both filtered and unfiltered samples were collected from twenty-two (22) primary locations to analyze for dissolved metals and total metals, respectively. Two (2) locations were sampled in duplicate yielding four (4) Field Duplicate samples (2 filtered and 2 unfiltered). Extra sample volume was collected from two (2) of the primary locations to obtain sufficient sample volumes to perform the analysis of the Matrix Spike/Matrix Spike Duplicate (MS/MSD) pairs. The sample points are summarized in Table 1.

Data Validation was performed in accordance with the U.S. Environmental Protection Agency (USEPA) Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (June 13, 1988 and modified February 1989). In addition, the Data Validation criteria from the Quality Assurance Project Plan (QAPjP) for the PDI were followed. When differing guidelines were encountered, the data validator used the more conservative (stricter) guideline. Data qualifiers are defined in Table 2.

The Laboratory had been provided with the quality control (QC) criteria set forth in the QAPjP and was to have prepared and analyzed Matrix Spike Duplicate (MSD) samples and Duplicate Control Samples (DCS). Although sufficient sample volume was collected to perform the MSD analysis, the Laboratory analysts followed the 7/88 SOW and performed Duplicate Sample analysis rather than MSD analysis. Additionally, the Laboratory analyzed Laboratory Control Samples (LCS) at the frequency specified within the 7/88 SOW. However, the analysis of the DCS pairs was not performed. Although some of these additional QC samples specified within the QAPjP were not analyzed, the Laboratory did follow the 7/88 SOW and performed analysis of all QC samples specified therein.

2.4 Blanks

In evaluating the contaminants in the laboratory preparation blanks (PBW), the Initial Calibration Blanks (ICB), and the Continuing Calibration Blanks (CCB), the data validator determined the appropriate action levels (as specified in the USEPA Region I Data Validation Guidelines) from the associated blank having the highest level of contamination and applied these action levels to all of the associated samples within the analytical sequence. In evaluating the contaminants in the field blanks, the data validator applied the results from the filtered field blanks to the filtered samples and the results from the unfiltered field blanks to the unfiltered samples. When the same contaminant was present in the field blank as in the preparation and/or analysis blanks, the highest level of contamination was used to determine the action level.

Please note that sample volumes and dilution factors have been taken into consideration when applying the appropriate blank action levels to the samples.

Various contaminants were detected in the blanks analyzed with the filtered samples reported in SDG 000600. Potassium, Arsenic, Iron, Copper and Manganese were detected in the laboratory blanks at negative absorbances thereby causing sample results which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Lead, Barium, Beryllium, Calcium, Iron, Magnesium, Sodium, Zinc, Arsenic, Manganese and Mercury were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the filtered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

Various contaminants were detected in the blanks analyzed with the unfiltered samples reported in SDG 000600. Potassium, Arsenic, Iron, Copper and Manganese were detected in the laboratory blanks at negative absorbances thereby causing sample results which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Barium, Beryllium, Calcium, Iron, Magnesium, Sodium, Zinc and Arsenic were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the unfiltered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Zinc, Calcium, Iron, Potassium, Copper and Arsenic were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the unfiltered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

2.5 ICP Interference Check Sample

The concentrations of Dissolved Calcium and/or Dissolved Iron in samples OW-17, OW-48A and OW-40 (SDG 000600) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Barium, Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentration of Dissolved Sodium in sample OW-17 was significantly greater than the suspected interference level and did not require qualification. The concentration levels of Dissolved Calcium and/or Dissolved Iron also produced suspected negative interferences with Antimony and Cadmium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

The concentrations of Total Calcium and/or Total Iron in samples OW-17, OW-48A and OW-40 (SDG 000600) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Barium, Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentrations of Total Sodium in samples OW-17 and OW-48 were significantly greater than the suspected interference level and did not require qualification. The concentration levels of Total Calcium and/or Total Iron also produced suspected negative interferences with Antimony and Cadmium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

The concentrations of Total Calcium in samples OW-42 and OW-50 (SDG 000613) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentration of Total Zinc in sample OW-50 was significantly greater than the suspected interference level and did not require qualification. The concentration levels of Total Calcium also produced suspected negative interferences with Antimony and Barium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

2.6 Matrix Spike Recoveries

Seven (7) primary samples {OW-48A (filtered and unfiltered) OW-18A (filtered and unfiltered) OW-42 (filtered) OW-44 (unfiltered) and OW-44 (filtered for Mercury only)} were used for Matrix Spike (MS) analysis. There were several analytes which did not meet the Contract Required Recovery criteria as specified in the SOW and the QAPjP. The actions resulting from the assessment of the MS data for filtered samples apply to all of the filtered samples for this task. The actions resulting from the assessment of the MS data for unfiltered samples apply to all of the unfiltered samples for this task.

Samples OW-42 and OW-44 were not designated for MS analysis by the sampler. It was determined by the Laboratory that additional MS samples were required to meet analytical batch QC requirements and the analysts chose to use these samples.

The MS recovery of Dissolved Selenium for OW-18A was greater than 125%. The MS recoveries of Dissolved Selenium for OW-48A and OW-42 and Dissolved Mercury for OW-18A were less than 75% but greater than 30%. The positive results for Dissolved Selenium and Dissolved Mercury in the unfiltered samples required qualification as estimated values (J). The non-detected results for Dissolved Selenium and Dissolved Mercury in the unfiltered samples required qualification as estimated quantitation limits (UJ).

The MS recoveries of Total Selenium for OW-48A and OW-44 and Total Lead and Total Mercury for OW-18A were less than 75% but greater than 30%. The positive results for Total Selenium, Total Lead and Total Mercury in the unfiltered samples required qualification as estimated values (J). The

2.9 Furnace Atomic Absorption Results

Total Arsenic analysis by Graphite Furnace Atomic Absorption (GFAA) was performed for all samples except OW-47, OW-43, OW-37, OW-45 and OW-12 which were analyzed by ICP. The post digestion spike recoveries for the remaining samples met the 85%-115% criteria.

Samples OW-46, OW-46DUP, OW-17, OW-38, OW-40 and OW-48 required analysis for Total Arsenic using the Method of Standard Addition (MSA). All criteria for MSA analysis were achieved.

Dissolved Arsenic analysis by GFAA was performed for all samples except OW-47, OW-43, OW-37, OW-45 and OW-12 which were analyzed by ICP. The post digestion spike recoveries for OW-22, OW-44 and 02EQB did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values.

Samples OW-46, OW-46DUP, OW-17, OW-14 and OW-48 required analysis for Dissolved Arsenic using MSA. All criteria for MSA analysis were achieved.

Total Selenium analysis by GFAA was performed for all samples. The post digestion spike recoveries for OW-46, OW-46DUP, OW-9, OW-17, OW-38, OW-48, OW-48A, OW-18A, OW-37, OW-50A, OW-18, OW-49, OW-49DUP, OW-44, OW-50 and OW-49A did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values. The non-detected results for this analyte required qualification as estimated detection limits.

Samples OW-14, OW-40, OW-43 and OW-45 required analysis for Total Selenium using MSA. All criteria for MSA analysis were achieved.

Dissolved Selenium analysis by GFAA was performed for all samples. The post digestion spike recoveries for OW-46, OW-46DUP, OW-9, OW-17, OW-38, OW-48, OW-48A, OW-18A, OW-47, OW-50A, OW-18, OW-22, OW-49DUP, OW-44, OW-42, OW-50 and OW-49A did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values. The non-detected results for this analyte required qualification as estimated detection limits.

Samples OW-14, OW-40 and OW-43 required analysis for Dissolved Selenium using MSA. All criteria for MSA analysis were achieved.

2.11 Detection Limit Results

All criteria for Instrument Detection Limits and Reporting Requirements were met by the Laboratory.

2.12 Sample Results

All sample results were within the linear range for ICP analysis and within the calibration range for Graphite Furnace Atomic Absorption analysis and Mercury analysis.

TABLE 1 (continued)

CLP Sample Point Identifications for PDI Arsenic Pit/Chromium Lagoon Groundwater Investigation Samples

Total Metals

Sample Point ID	ETC ID	SDG
OW-14	CA6450	000600
OW-17	CA6451	000600
01EQB	CA6452	000600
OW-38	CA6453	000600
OW-48	CA6454	000600
OW-48A	CA6455	000600
OW-48AMS	CA6455MS	000600
OW-48AMSD	CA6455MSD	
OW-40	CA6458	000600
OW-46	CA6459	000600
OW-46DUP	CA6460	000600
OW-9	CA6461	000600
OW-47	CA6462	000612
OW-43	CA6463	000612
OW-37	CA6464	000612
OW-22	CA6465	000612
OW-50A	CA6466	000612
OW-18	CA6468	000612
OW-18A	CA6469	000612
OW-18AMS	CA6469MS	000612
OW-18AMSD	CA6469MSD	
OW-45	CA6471	000612
OW-44	CA6472	000613
OW-49	CA6473	000612
OW-49DUP	CA6474	000612
OW-12	CA6475	000613
OW-42	CA6476	000613
OW-50	CA6565	000613
OW-49A	CA6566	000613
02EQB	CA6594	000613

APPENDIX G

Non-CLP Data Assessment

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF OVERALL DATA QUALITY
FOR TASK 37

PERFORMED BY: **Lori Anne Hendel** Lori Anne Hendel DATE: **July 8, 1991**

	YES/NO/NA
1. Were the QAPjP, laboratory reports, and field documentation available to support data assessment procedures?	yes
2. Precision:	
Are DCS RPD within control limits?	yes@
Are lab duplicate RPD within control limits?	yes@
Are field duplicate RPD within control limits?	no@
Are MS/MSD RPD within control limits?	yes@
Overall assessment of precision @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. Overall, the precision of the measurements is acceptable for this task.	
3. Accuracy:	
Is absolute recovery within control limits for DCS?	yes@
Is relative recovery within control limits for MS/MSD?	yes@
Overall assessment of accuracy @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. Overall, the accuracy of the measurements is acceptable for this task.	
4. Representativeness:	
Were procedures in the FSP followed?	yes
If not, were procedural variations approved and documented?	N/A
Were sample preservation procedures given in the FSP followed?	yes
Were data reported in the proper units?	yes
Was blank contamination not evident or well documented at low levels?	yes@
Were field duplicates within control limits?	no@
Overall assessment of representativeness @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. The qualified data represents conditions at the Site.	

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF LABORATORY PERFORMANCE
FOR TASK 37

LABORATORY: **ETC Corp./ Chyun Associates** REPORT #: **000600, 612, 613**

VALIDATED BY: **Lori Anne Hendel** DATE: **July 8, 1991**

		YES/NO/NA
1.	Release authorization with signature present?	yes
2.	Sample identification summary/description present?	N/A
3.	Analytical results present, including:	yes
	correct units?	yes
	detection limits?	yes
	method used?	yes
	date sampled?	yes
	date received?	yes
	date prepared?	yes
	date analyzed?	yes
	dilutions noted?	yes
4.	Holding times met?	yes*
5.	Lab duplicate RPDs within control limits (20%)?	yes^
	Field duplicate RPDs within control limits (30%)?	no^^
6.	MS/MSD % recoveries within control limits (75-125%)?	yes#
7.	MS/MSD RPDs within control limits (30%)?	yes##
8.	Duplicate control sample (DCS) accuracy within given control limits (80-120%)? **(Blank Spikes)**	yes@
9.	DCS precision within given control limits (20%)?	yes@@
10.	Method blanks "clean"?	yes
11.	Chain-of-Custody present and complete with signatures and dates?	yes
12.	Name of analyst/supervisor given?	yes
13.	Procedural deviations noted?	yes
14.	QC procedures given?	N/A

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF FIELD PERFORMANCE
FOR TASK 37

SAMPLER/ORGANIZATION: Michael J. Zarenski (Golder) REPORT #: 000600,
Stephen A. Wheeler (Golder) 612, 613

VALIDATED BY: Lori Anne Hendel DATE: July 8, 1991

		YES/NO/NA
1.	Does field documentation include:	
	date/time samples collected?	yes
	sample location?	yes
	name of sampler?	yes
	field measurements?	yes
	sampling method?	yes
	instruments/methods for field measurements?	yes
	calibration/maintenance of field instruments?	no^
	sampling containers used (COC*)?	yes
	sample preservation procedures (see COC*)?	yes
	Chain-of-Custody procedures?	yes
	field quality control procedures?	yes
2.	Were procedures in the Field Sampling Plan followed?	yes
	If not, were procedural variances approved and documented?	N/A
3.	Was contamination of field blank samples not evident, or well documented at low levels?	yes+
4.	Are field duplicates within control limits?	no=

5. Comments: ^ Per the instructions of the Task Manager, Redox Potential (Eh) was measured using an ORP Probe which was not calibrated daily. pH and specific conductivity meters were properly calibrated on a daily basis.

\+ Low level metals were detected in the equipment blanks. Also, Ammonia and Total Kjeldahl Nitrogen at 3.7 mg/l each, and Total Dissolved Solids at 56 mg/l.

= Field Duplicate RPDs were out-of-control for the following:
OW-46 - TOC (108%)
OW-49 - Ammonia (62%) and Total Kjeldahl Nitrogen (101%)

* Chain-of-Custody Form

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6442

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-414 (Source Code (from below) / Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1450 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys ....(C) Other .....(X)

Soil ..(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS ✓	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONS	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D S Ley Jr.
   Date: 4/17/91 Time: 1450 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 301

4. Shuttle Sealed By (print) DAVID S. LEY Date: 4/17/91 Time: 1530
   Signature: D S Ley Jr. Seal #: 189342 Intact: Y

LAB USE ONLY Opened By: A. Wheeler Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6 SEAL # 189342 COND. Intact

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1)

ORIGINAL

Seal No. 189349 ETC Job # CA6445

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-01W-112 (Source Code (from below); Your Sample Point ID (left justify)) 91/04/18 (Start Date (YY/MM/DD)) 0940 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ...(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

#	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
	MET	1000	HNO3	METALS •	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FILTER USED	✓ more preservative added at ETC 4/19/91
	CONS	1000	H2SO4	NH3/TKN •	Y		✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/18/91 Time: 1638
Signature: Michael Zarenski Seal #: 189349 Intact: Y

I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature: 303
Date: Time: Remarks:

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1005
Signature: Seal #: 189350 Intact: Y

LAB USE ONLY Opened By: Date: 4/19/91 Time: 940
SHUTTLE # 1131 TEMP. °C 4.8 SEAL # 189350 COND.

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189349 ETC Job # CA6446

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: INTERSECTION OF COMMERCE WAY & Phone: (617) 938 - 0530

Address: ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code)

Sample Point: W-OW-42 (Source Code (from below) / Your Sample Point ID (left justify)) 91/04/18 (Start Date (YY/MM/DD)) 0850 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

(W) Outfall ..... (O) Bottom Sediment .... (B) Surface Impoundment .... (I) Leachate Collection Sys. .... (C) Other ..... (X)

(S) River/Stream .. (R) Generation Point .... (G) Treatment Facility ..... (T) Lake/Ocean ..... (L) Specify _____

SHUTTLE CONTENTS

No.	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Fill. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS •	Y	.45 MICRON	✓
	CONS	125	H2SO4	TOC/COD •	Y	FILTER USED	✓
	CONS	1000	H2SO4	NH3/TKN •	Y		✓ More pres added at ETC 04/19
	CONU	125	NONE	SOLIDS/TD •	N		✓
	UTB	40	GC/MS	TEMPERATURE •			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1638
   Signature: mike Zarenski Seal #: 189349 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 305

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1005
   Signature: mike Zarenski Seal #: 189350 Intact: Y

LAB USE ONLY Opened By: [illegible] Date: 4/19/91 Time: 940

SHUTTLE # 1131 TEMP. °C 4° SEAL # 189350 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6472

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-141 (Source Code (from below), Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1450 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D Stirling Ley
   Date: 4/17/91 Time: 1450 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 307

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1536
   Signature: D Stirling Ley Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6 SEAL # 189342 COND. Intact

LTC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189349 ETC Job # CA6476

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Description)

Sample Point: W-OW-412 (Source Code (from below); Your Sample Point ID (left justify)) 91/04/18 (Start Date (YY/MM/DD)) 0850 (Start Time (2400 hr. clock)) (Elapsed Hours (days/parts))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean.....(L) Specify _____

SHUTTLE CONTENTS

No.	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1638

Signature: Michael Zarenski Seal #: 189 349 Intact: Y

2. I have received these materials in good condition from the above person.

Name: Signature:

Date: Time: Remarks:

3. I have received these materials in good condition from the above person.

Name: Signature:

Date: Time: Remarks: 309

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1805

Signature: Michael Zarenski Seal #: 189350 Intact: YES

LAB USE ONLY Opened By: Date: 4/19/91 Time: 949

SHUTTLE # 1131 TEMP. °C 40 SEAL # 189350 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6563

Sample Point [W] [0W-15Ø] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
91 04 17	1345	3.3	24	100 → Dry

SAMPLING METHOD:

Sampler Type	[E]	A-Submersible Pump, B-ISCO, C-Bladder Pump	D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel	X-Other (SPECIFY OTHER)
Sampler Material	[A]	A-Teflon, B-Metal	C-PVC, D-Plastic	X-Other (SPECIFY OTHER)
Tubing Material	[NA]	A-Teflon, B-Tygon	C-Polyethylene, D-Silicon	X-Other (SPECIFY OTHER)
Sample Composited	[Y (N)]			

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)		Well Depth (ft)	50.00
Depth to Ground water (ft)	13.10	Sample Depth (non-well) (ft)	
Groundwater Elevation (ft msl)			

	ph		spec. cond.		(other parameter)		value		units
1st	5.71	(STD)	2700	um/cm at 25°C	EH		75 82		mV
2nd	5.73	(STD)	2700	um/cm at 25°C	EH		75 83		mV
3rd		(STD)		um/cm at 25°C					
4th		(STD)		um/cm at 25°C					

Sample Temp: 9.6 (°C) Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slight reddish tinge, no odor

Weather Conditions: Cloudy, 45°F, Wind 5-10mph NE

Other: Purge vol = (3)(36.90)(.652) = 72.18 .652 gal/ft 4" casing

Well Purged dry, Approx 1500 gallons removed over 2 days of development

NB Well purged at time of development

Well not surveyed at time of sampling.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) MIKE ZARENSKI Employer: GOLDER ASSOC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6564

Sample Point W | OW-19A
Source Code | Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910418	Ø813	1.2	11.24	64

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: NA — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y/N ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): ______

Well Depth (ft): 27.5

Depth to Ground water (ft): 10.26

Sample Depth (non-well) (ft): ______

Groundwater Elevation (ft msl): ______

	ph (STD)		spec. cond. (um/cm at 25°C)	other parameter	value	units
1st	6.46	1st	83Ø	EH	57	mV
2nd	6.45	2nd	83Ø	EH	57	mV
3rd		3rd				
4th		4th				

Sample Temp: 10.3 (°C)

Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Slightly turbid, no odor

Weather Conditions: Cloudy, 45°F, Winds 5-10mph NE

Other: Purge vol = (3)(17.24)(0.652) = 33.72 gals 0.652 gal/ft 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): MIKE ZALENSKI Employer: GOLDER ASSOC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) [signature] (Signature)

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ORIGINAL

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 0192415 ETC Job # CA6566

Date Sealed 91/04/16 By: MA

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 1553

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVE., WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W-4191A (Source Code (from below); Your Sample Point ID (left justify)) 910418 (Start Date (YY/MM/DD)) 1110 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/18/91 Time: 1630
Signature: Michael Zarenski Seal #: 192415 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks: 315

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 4/18/91 Time: 1240
Signature: Michael Zarenski Seal #: 192416 Intact: Y

LAB USE ONLY Opened By: M Bleiler Date: 4/19/91 Time: 930

SHUTTLE # 621 TEMP. °C 7° SEAL # 192416 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # ~~CA6489~~ CA6593 4/19/91

Sample Point [X] (Source Code) [D|2|E|Q|3] (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)
Depth to Ground water (ft)
Groundwater Elevation (ft msl)
Well Depth (ft)
Sample Depth (non-well) (ft)

	ph		spec. cond.		other parameter	value	units
1st	6.59 (STD)	1st	11.6	um/cm at 25° C	Eh	177	mV
2nd	6.37 (STD)	2nd	11.6	um/cm at 25°C	Eh	177	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 14.4 (°C)
Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Clear, no odor
Weather Conditions: Cloudy, slight breeze, 45°F
Other:
distilled water transferred from 5 gallon nalgene container into bailer then to bottles
filtered samples filtered using transfer vessel used for all other wells

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) Michael Zarenski (Signature)

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ORIGINAL

LTC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1)

ORIGINAL

Seal No. 189319 ETC Job # CA6432

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GIOILIDIISIRITI (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: WI-OW-17 (Source Code (from below); Your Sample Point ID (left justify)) 911041116 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)
Soil ....(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER FILL (Y/N)	SAMPLER Observations	LAB Observations
	MET	1000	HNO3	METALS •	Y	QED WITH 45	✓
1	CONS	125	H2SO4	TOC/COD •	Y	MICRON IN-LINE	✓
	CONS	1000	H2SO4	NH3/TKN •	Y	FILTER (MODEL #FF800)	✓
	CONU	125	NONE	SOLIDS/TD •	N		✓
1	UTB	40	GC/MS	TEMPERATURE Bottle missing when shuttle was checked in.			✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1647
Signature: Michael Zarenski Seal #: 189319 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature: 341
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/16 Time: 1450
Signature: Michael Zarenski Seal #: 189320 Intact: Yes

LAB USE ONLY Opened By: [illegible] Date: 4/19/91 Time: 1245
SHUTTLE # 694 TEMP. °C 6 SEAL # 189320 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6433

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-143 (Source Code (from below) / Your Sample Point ID (left justify)) 910416 (Start Date (YY/MM/DD)) 1130 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS •	Y	.45 micron	✓
1	CUNS	125	H2SO4	TOC/COD •	Y	In line filter	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	used QED	✓
1	CUNU	125	NONE	SOLIDS/TD •	N	model FF8200	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1051
   Signature: Michael Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____ 343
   Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1500
   Signature: Michael Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: _____ Date: 4/17/91 Time: 1220

SHUTTLE # 42 TEMP. °C 6° SEAL # 189318 COND. Intact 4/17/91

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6434

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: ______ Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDUSRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W - OW-137 (Source Code (from below); Your Sample Point ID (left justify)) 91 04 16 (Start Date (YY/MM/DD)) 1200 (Start Time (2400 hr. clock)) ___ (Elapsed Hours (composite))

Source Codes:
Well ...(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify ______

SHUTTLE CONTENTS

#	BOTTLE Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	Observations	LAB Observations
1	MET	1000	HNO3	METALS	Y	QED Inline	✓
	CONS	125	H2SO4	TOC/COD	Y	filter	✓
1	CONS	1000	H2SO4	NH3/TKN	Y	model	✓
	CONU	125	NONE	SOLIDS/TD	Y	FF-8200	✓
	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened	/	used	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1051
Signature: Michael O Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.
Name: ______ Signature: ______
Date: ______ Time: ______ Remarks: ______

3. I have received these materials in good condition from the above person.
Name: ______ Signature: ______
Date: ______ Time: ______ Remarks: ______ 345

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1500
Signature: Michael O Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/17/91 Time: 1220
SHUTTLE # 42 TEMP. °C 6 SEAL # 189318 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 184313 ETC Job # CA6435

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W1-212 (Source Code (from below) / Your Sample Point ID (left justify)) 910411 (Start Date (YY/MM/DD)) 1230 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	QE) with .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	micron in-line	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	filter used	✓ Reid Broker
1	CONU	125	NONE	SOLIDS/TD ✓	N	(Model FF800)	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1349
   Signature: Stephen A. Wheeler Seal #: 0189313 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature: 347
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1605
   Signature: Stephen A. Wheeler Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1235

SHUTTLE # 307 TEMP. °C 6 SEAL # 189314 COND. Good

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Seal No. 189313 ETC Job # CA6436

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W (Source Code (from below)) - OW-150A (Your Sample Point ID) 910411 (Start Date (YY/MM/DD)) 1520 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other ....(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ......(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	QED with .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	micron filter used	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	(MODEL FF 8200)	✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING FROM SHUTTLE			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1349
Signature: [signature] Seal #: 0189313 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature: 349
Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/11 Time: 1605
Signature: [signature] Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/12/91 Time: 1230
SHUTTLE # 307 TEMP. °C 6 SEAL # 189314 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189345 ETC Job # CA6438

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: _____ Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RI (Facility/Site Code) _____ (Optional Sample Point Descriptions)

Sample Point: W-OW-118 (Source Code (from below) / Your Sample Point ID (left justify)) | 91/04/17 (Start Date (YY/MM/DD)) | 12/11 (Start Time (2400 hr. clock)) | _____ (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys. ....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNU3	METALS ✓	Y	.45 MICRONS	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FIELD FILTER	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	USED	✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 9104 09 Time: 1335
   Signature: Stephen A. Wheeler Seal #: 189345 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Mike Zarenski Signature: Michael Zarenski
   Date: 4/17/91 Time: 1200 Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 351

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1250
   Signature: Michael Zarenski Seal #: 189346 Intact: Y

LAB USE ONLY Opened By: [illegible] Date: 4/18/91 Time: 943

SHUTTLE # 182 TEMP. °C 5 SEAL # 189346 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189343 ETC Job # CA6439

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIST1 (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-01W-118A (Source Code (from below), Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 1000 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys ...(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS •	Y	USED .45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FIELD FILTER	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y		✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1717
   Signature: mike Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature: 353
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/17/91 Time: 1055
   Signature: mike Zarenski Seal #: 189349 Intact: Y

LAB USE ONLY Opened By: D. Steplin Date: 4/18/91 Time: 955

SHUTTLE # 836 TEMP. °C 6° SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189343 ETC Job # ~~CA6440~~ CA6439

Date Sealed 91/04/05 By: MW mw 4/18/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: _____ Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDSRTI (Facility/Site Code) ~~Dupli~~ Matrix Spike (Optional Sample Point Descriptions)

Sample Point: X-GW-118AMS1 (Source Code (from below); Your Sample Point ID (left justify)) 91/04/17 (Start Date (YY/MM/DD)) 1030 (Start Time (2400 hr. clock)) _____ (Elapsed Hours (composite))

Source Codes:

Well ...(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ....(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNU3	METALS •	Y	In line	✓
1	CONS	125	H2SO4	TOC/COD •	Y	filter	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	used	✓
1	CONU	125	NONE	SOLIDS/TD •	N	.45 micron	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened	✓		

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1717
   Signature: Mike Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 355

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1055
   Signature: Mike Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: A. Sleppler Date: 4/18/91 Time: 955

SHUTTLE # 836 TEMP. °C 6° SEAL # 189394 COND. Intact

ETC and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 187545 ETC Job # ~~CA6437~~ CA6439

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE

Attn.: GOLDER ASSOCIATES, INC.

Facility/Site:

Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDINSRT (Facility/Site Code) Matrix Spike Duplicate (Optional Sample Point Descriptions)

Sample Point: X-GW-118AMS01 (Source Code (from below); Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) Elapsed Hours (composite)

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other ......(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ......(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	.45 micron	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	Filter used	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1335
Signature: Stephen A. Wheeler Seal #: 0189345 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Mike Zarenski Signature: Michael Zarenski
Date: 4/17/91 Time: 1100 Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

357

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1250
Signature: Michael Zarenski Seal #: 189346 Intact: Y

LAB USE ONLY Opened By: A Stoholer Date: 4/18/91 Time: 945
SHUTTLE # 182 TEMP. °C 5 SEAL # 189346 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189341 ETC Job # CA6441

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R I (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0 W-1 4 5 | 9 1 0 4 1 7 | 1 4 1 5 |

Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr. clock)	Elapsed Hours (composite)
W	W-0 W-145	910417	1415	

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys. ...(C) Other ..... (X)

Soil ....(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean ..... (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER FIIL (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNU3	METALS ✓	Y	'45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y		✓
1	CONU	125	NONE	SOLIDS/TD ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Stephen A. Wheeler Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature: D. Stanley
   Date: 4/17/91 Time: 1415 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 359

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1536
   Signature: D. Stanley Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 1090

SHUTTLE # 1183 TEMP. °C 6° SEAL # 189342 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 107221 ETC Job # CA6443

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIST (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-01W-419 (Source Code (from below) / Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1630 (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS *	Y	.45 MICRON	✓
1	CONS	125	H2SO4	TOC/COD *	Y	FILTER USED	✓
1	CONS	1000	H2SO4	NH3/TKN *	Y		✓
1	CONU	125	NONE	SOLIDS/TD *	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1059
   Signature: Michael Zarenski Seal #: 189351 Intact: Y
2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:
3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 361
4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
   Signature: Michael Zarenski Seal #: 189352 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/18/91 Time: 955

SHUTTLE # 0 TEMP. °C 5 SEAL # 189352 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189351 ETC Job # CA6444

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code) DUPLICATE (Optional Sample Point Descriptions)

Sample Point: X - OW-49DUP (Source Code (from below); Your Sample Point ID (left justify)) 91 04 17 (Start Date (YY/MM/DD)) 1630 (Start Time (2400 hr. clock)) Elapsed Hours (composite)

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys .....(C) Other ....(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	.45 micron	✓
1	CONS	125	H2SO4	TOC/COD •	Y	In line	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	filter	✓
1	CONU	125	NONE	SOLIDS/TD •	N	used	✓
1	UTB	40	GC/MS	TEMPERATURE •			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/9/91 Time: 1059
Signature: Michael Zarenski Seal #: 189351 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks: 363

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
Signature: Michael Zarenski Seal #: 189352 Intact: Yes

LAB USE ONLY Opened By: [signature] Date: 4/18/91 Time: 955
SHUTTLE # 0 TEMP. °C 5 SEAL # 189352 COND. Intact

FTC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189319 ETC Job # CA6462

Date Sealed 91/04/05 By: mw

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDINSRT (Facility/Site Code)

Sample Point: W-OW-47 (Source Code (from below); Your Sample Point ID (left justify)) 910404 (Start Date (YY/MM/DD)) 1100 (Start Time (2400 hr. clock)) (Elapsed Hours (composite); Optional Sample Point Descriptions)

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1647
   Signature: [signature] Seal #: 189319 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 365

4. Shuttle Sealed By: (print) mike Zarenski Date: 91/04/16 Time: 1450
   Signature: [signature] Seal #: 189320 Intact: YES

LAB USE ONLY Opened By: [signature] Date: 4/9/91 Time: Overlock

SHUTTLE # 694 TEMP. °C 6 SEAL # 189320 COND. 1245

FTC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189317 ETC Job # CA6464

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRI (Facility/Site Code) (Optional Sample Point Description)

Sample Point: MW-ON-317 (Source Code (from below) / Your Sample Point ID (left justify)) 911041 (Start Date (YY/MM/DD)) 1230 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ....(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

	BOTTLE			ANALYSIS	SAMPLER		LAB
	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1051
   Signature: Michael Zarenski Seal #: 189317 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 367

4. Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/11 Time: 1500
   Signature: Michael Zarenski Seal #: 189318 Intact: YES

LAB USE ONLY Opened By: Date: 4/9/91 Time: 1220

SHUTTLE # 42 TEMP. °C 6 SEAL # 189318 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189313 ETC Job # CA6466

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-OW-150A | 910411 | 1520 |

Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr clock)	Elapsed Hours (composite)
W	OW-150A	910411	1520	

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE No	BOTTLE Type	BOTTLE Size	BOTTLE Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A WHEELER Date: 910409 Time: 1345
   Signature: Stephen A. Wheeler Seal #: 0189313 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 369

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/11 Time: 1605
   Signature: Stephen A. Wheeler Seal #: 189314 Intact: YES

LAB USE ONLY Opened By: D. Blanchard Date: 4/17/91 Time: 1230

SHUTTLE # 307 TEMP/C 6 SEAL # 189314 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 101343 ETC Job # CA6469

Date Sealed 91/04.05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code)

(Optional Sample Point Descriptions)

Sample Point: W - O W1 - 1 8 A (Source Code (from below); Your Sample Point ID (left justify))

9 1 0 4 1 7 (Start Date (YY/MM/DD)) 1 0 1 0 0 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/18/91 Time: 1717
   Signature: Michael Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: 371

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/19/91 Time: 1055
   Signature: Michael Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: R. Stepler Date: 4/18/91 Time: 955

SHUTTLE # 836 TEMP. °C 6° SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 187343 ETC Job # ~~CA6470~~ CA6469

Date Sealed 91/04/05 By: MW

mw 4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) Matrix Spike (Optional Sample Point Descriptions)

Sample Point: X (Source Code (from below)) - OW-118AMS (Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1030 (Start Time (2400 hr. clock)) Elapsed Hours (composite)

Source Codes:
Well ..(W) Outfall ....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys. ....(C) Other ....(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1717
Signature: Michael Zarenski Seal #: 189343 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks: 372

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/17/91 Time: 1055
Signature: Michael Zarenski Seal #: 189344 Intact: Y

LAB USE ONLY Opened By: A. Stezeln Date: 4/18/91 Time: 935
SHUTTLE # 836 TEMP. °C 6 SEAL # 189344 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 189341 ETC Job # CA6471

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code)

(Optional Sample Point Descriptions)

Sample Point: W - O W - 4 5

Source Code (from below)	Your Sample Point ID (left justify)	Start Date (YY/MM/DD)	Start Time (2400 hr. clock)	Elapsed Hours (composite)
W	OW-45	91/04/17	1415	

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER FIlt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		/

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1054
   Signature: Seal #: 0189341 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: DAVID S. LEY Signature:
   Date: 4/17/91 Time: 1425 Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks: 374

4. Shuttle Sealed By: (print) DAVID S. LEY Date: 4/17/91 Time: 1538
   Signature: Seal #: 189342 Intact: YES

LAB USE ONLY Opened By: Date: 4/18/91 Time: 1000

SHUTTLE # 1183 TEMP. °C 6° SEAL # 189342 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189351 ETC Job # CA6474

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) DUPLICATE (Optional Sample Point Descriptions)

Sample Point: X (Source Code (from below)) -DW-49DWP (Your Sample Point ID (left justify)) 910417 (Start Date (YY/MM/DD)) 1630 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ......(X)
Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1059
Signature: Michael Zarenski Seal #: 189361 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks: 376

4. Shuttle Sealed By: (print) MIKE ZARENSKI Date: 91/04/17 Time: 1705
Signature: Michael Zarenski Seal #: 0189352 Intact: YES

LAB USE ONLY Opened By: A. Stezler Date: 4/18/91 Time: 855
SHUTTLE # 2 TEMP. °C 5 SEAL # 189352 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6592

Sample Point: W (Source Code) ~~OW-22~~ (Sample Point I.D.)

FIELD PROCEDURES

OW-22 ma 4/25/91

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910418	~~0915~~ 0906		1.2	5 → Dry

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: D — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: / — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y/(N) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): 81.80
Well Depth (ft): 16.64
Depth to Ground water (ft): 9.00
Sample Depth (non-well) (ft):
Groundwater Elevation (ft msl): 72.80

VALUES ARE CORRECT ADL inL

	ph (STD)	spec. cond. (um/cm at 25°C)	other parameter	value	units
1st	6.81	2100	EH	166	mV
2nd	6.81	2100	EH	166	mV
3rd					
4th					

Sample Temp: 8.3 (°C)
Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: slightly Turbid, no odor

Weather Conditions: Cloudy, 45°F Slight wind

Other: .163 gal/ft 2" Casing

Purge Vol = (16.64 - 9.0)(.163)(3) = 4.0

well purged dry @ 5.0 gallons.

This is a resampling due to broken bottles

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): Mike Zarenski
Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/18/91 (Date) Michael Zarenski (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # ~~CA6448~~ CA 6673

Sample Point: W | OW-1501A
Source Code BL — Sample Point I.D.
4/25/91

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910418	1655		12	36

SAMPLING METHOD:

Sampler Type: X — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other: watera (SPECIFY OTHER)

Sampler Material: X — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other: Polyethylene (SPECIFY OTHER)

Tubing Material: C — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other: ______ (SPECIFY OTHER)

Sample Composited: Y/N (N circled) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): * ______
Well Depth (ft): 30.26
Depth to Ground water (ft): 12.87
Sample Depth (non-well) (ft): ______
Groundwater Elevation (ft msl): ______

	ph	(STD)		spec. cond.		other parameter	value	units
1st	5.84	(STD)	1st	1200	umhos/cm at 25°C	Eh	51	mV
2nd	5.86	(STD)	2nd	1200	umhos/cm at 25°C	Eh	51	mV
3rd		(STD)	3rd		umhos/cm at 25°C			
4th		(STD)	4th		umhos/cm at 25°C			

Sample Temp: 9.5 (°C)
Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Yellowish, no odor
Weather Conditions: Partly Sunny, 45°F Slight breeze
Other:
Purge Volume = (30.26 − 12.87)(.652)(3) = 34
well not surveyed information not available
.652 gal/ft 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): Mike Zarenski
Employer: Golder Assoc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4 (Date) — Michael Zarenski (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA642C

Sample Point [W] [0W114] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
911041111	1121A	----	27.012	198.10

SAMPLING METHOD:

Sampler Type	[E]	A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel	X-Other	(SPECIFY OTHER)
Sampler Material	[A]	A-Teflon, B-Metal, C-PVC, D-Plastic	X-Other	(SPECIFY OTHER)
Tubing Material	[N/A]	A-Teflon, B-Tygon, C-Polyethylene, D-Silicon	X-Other	(SPECIFY OTHER)
Sample Composited	[Y/N]			Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)	1651.54	Well Depth (ft)	1485.0
Depth to Ground water (ft)	1706	Sample Depth (non-well) (ft)	
Groundwater Elevation (ft msl)	~~1644~~ SAM/9/04/12 58.48		

	ph		spec. cond.		(other parameter)	value	units
1st	6.15 (STD)	1st	1680	um/cm at 25°C	EH	306	mV
2nd	6.14 (STD)	2nd	1680	um/cm at 25°C	EH	304	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp	Turbidity
11.12 (°C)	NTU

FIELD COMMENTS

Sample Appearance: CLEAR SOME REDDISH BROWN MATTER

Weather Conditions: SUNNY SLIGHT BREEZE ~50°F

Other:

PURGE CALC: DEPTH OF WELL - DEPTH TO WATER x .652 (gal/ft of 4" casing) x 3 = PURGE VOL.

48.50 - 7.06 = 41.44 x .652 x 3 = 81.0lc

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC. INC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

9/04/12 (Date) Stephen A. Wheeler (Signature)

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6421
Sample Point W OW117 (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910410	1415	1.3	13	40

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: NA — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y/N (N circled) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): 578.6
Well Depth (ft): 26.32
Depth to Ground water (ft): 6.18
Sample Depth (non-well) (ft): ______
Groundwater Elevation (ft msl): 516.8

	ph (STD)		spec. cond. (umhos/cm at 25°C)	other parameter	value	units
1st	6.75	1st	7850	EH	-31.6	mV
2nd	6.77	2nd	7850	EH	-32.1	mV
3rd		3rd				
4th		4th				

Sample Temp: 15.4 (°C)
Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Brownish color strong odor
Weather Conditions: Sunny 65°F 40 mph winds
Other: Purge Vol = (26.32 − 6.18)(.652)(3) = 39.4

OW17 is 4" diameter PVC well Purged using dedicated 1" Brady Valve on the end of Polyethylene Tubing
Began sampling at 0815 and stopped at 0900 ~~due to~~ returned to finish sampling @ 1230

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zorenski (Print)   Employer: Golder

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/11/91 (Date)   michael Zorenski (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA422

Sample Point K | C1 1 E Q B (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
—	—	—	—	—

SAMPLING METHOD:

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material: — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited: Y/N (N) — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): —

Depth to Ground water (ft): —

Groundwater Elevation (ft msl): —

Well Depth (ft): —

Sample Depth (non-well) (ft): —

	ph (STD)	spec. cond. (um/cm at 25°C)	other parameter	value	units
1st	5.94	150	EH	224	mv
2nd	5.95	150	EH	224	mv
3rd					
4th					

Sample Temp: 20.5 (°C)

Turbidity: (NTU)

FIELD COMMENTS

Sample Appearance: clear, no odor

Weather Conditions: Sunny, 65°F 40 mph winds

Other: Equipment blank performed at CW17, Purchased distilled water was run through a disposable bailer then transferred to bottles, for filtered parameters water was transferred from bailer to filtering vessel and filtered

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/11/91 (Date) [signature] (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6423

Sample Point [W] [0W38] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910411	1540		16.16	220.50

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [N/A] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/(N)] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)	714.0	Well Depth (ft)	11.10
Depth to Ground water (ft)	6.93	Sample Depth (non-well) (ft)	
Groundwater Elevation (ft msl)	6.47		

	ph		spec. cond.		other parameter	value	units
1st	6.49 (STD)	1st	810	um/cm at 25°C	EH	114.2	mV
2nd	6.50 (STD)	2nd	820	um/cm at 25°C	EH	114.3	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 8.3 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: REDDISH BROWN, SUSPENDED MATTER

Weather Conditions: SUNNY, VERY WINDY, 40° F

Other: PURGE VOLUME CALC. - WELL DEPTH - DEPTH TO WATER x .652 x 3

17.10 - 6.93 = 10.17 x .652 x 3 = 19.89

.652 gal/ft of 4" casing

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC INC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

910412 (Date) Stephen A. Wheeler (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6424

Sample Point W 0W418 (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910411	1413	---	24.97	90.0

SAMPLING METHOD: ______

Sampler Type: E — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ______ (SPECIFY OTHER)

Sampler Material: A — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ______ (SPECIFY OTHER)

Tubing Material: N/A — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ______ (SPECIFY OTHER)

Sample Composited: Y (N) ______ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) * ______

Depth to Ground water (ft) 7.70

Groundwater Elevation (ft msl)* ______

Well Depth (ft) 46.0

Sample Depth (non-well) (ft) ______

	ph (STD)		spec. cond. (umhos/cm at 25°C)	other parameter	value	units
1st	5.84	1st	1200	EH	176	mV
2nd	5.85	2nd	1200	EH	175	mV
3rd		3rd				
4th		4th				

Sample Temp: 17.6 (°C)

Turbidity: ______ NTU

FIELD COMMENTS

Sample Appearance: Cloudy, some suspended particles

Weather Conditions: Sunny, very windy, cold 40°F

Other: Purge vol calc - well depth - depth to water x .652 (gal/ft of 4" casing) x 3 = 46.0 - 7.7 = 38.30 x .652 x 3 = 74.91

Well elevation not surveyed, elevation unknown.

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler (Print): Stephen A. Wheeler   Employer: Golder Assoc Inc.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

910412 (Date)   [signature] (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6425

Sample Point [N] [0 W 4 B A] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
91 04 12	1450	4	12.15	40.10

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ____ (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ____ (SPECIFY OTHER)

Tubing Material [N/A] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ____ (SPECIFY OTHER)

Sample Composited [Y/(N)] ____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) * ____ Well Depth (ft) 26.50

Depth to Ground water (ft) 7.31 Sample Depth (non-well) (ft) ____

Groundwater Elevation (ft msl) ____

* WELL NOT SURVEYED INFORMATION UNAVAILABLE

	ph		spec. cond.		other parameter	value	units
1st	5.63 (STD)	1st	1250	um/cm at 25°C	EH	257	mV
2nd	5.63 (STD)	2nd	1250	um/cm at 25°C	EH	256	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 7.4 (°C) Turbidity: ____ NTU

FIELD COMMENTS

Sample Appearance: CLOUDY

Weather Conditions: SUNNY VERY WINDY 40°F

Other:

PURGE VOL CALC = DEPTH OF WELL - DEPTH TO WATER x .652 (gal/ft of 4" casing)
x 3 = PURGE VOLUMES
26.50 - 7.31 = 19.19 x .652 x 3 = 37.54

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

91/04/12 (Date) Stephen A. Wheeler (Signature)

ORIGINAL

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189325 ETC Job # ~~CA6426~~ CA6425

Date Sealed 91/04/05 By: MW

4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDDIISRTI (Facility/Site Code) Matrix Spike (Optional Sample Point Description)

Sample Point: X-GW418AMIS (Source Code (from below) / Your Sample Point ID (left justify)) 910414 (Start Date (YY/MM/DD)) 1015 (0945) (Start Time (2400 hr. clock)) ~ (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall .....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

MW 4/16/91

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNU3	METALS *		QED model	✓
1	CONS	125	H2SO4	TOC/COD *		FF 8200	✓
1	CONS	1000	H2SO4	NH3/TKN *		field filter	✓
1	CONS	125	NONE	SOLIDS/TD *		used	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was opened			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1706
   Signature: Michael C Zarenski Seal #: 189325 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1116
   Signature: Michael C Zarenski Seal #: 189326 Intact: Y

LAB USE ONLY Opened By: A. Stegalla Date: 4/15/91 Time: 1210

SHUTTLE # 59 TEMP. °C 6° SEAL # 189326 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 198997 ETC Job # ~~CA6419~~ CA6425

Date Sealed 91/04/05 By: WW ms 4/15/91

Company: C/O INDUSTRI-PLEX SITE

Attn.: GOLDER ASSOCIATES, INC.

Facility/Site:

Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) MATRIX SPIKE DUPLICATE (Optional Sample Point Description)

Sample Point: X (Source Code, from below) -OW418AMSD (Your Sample Point ID, left justify) 910412 (Start Date, YY/MM/DD) 1045 (Start Time, 2400 hr. clock) (0945) ms 4/16/91 (Elapsed Hours, composite)

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	QED MODELL	✓
1	CONS	125	H2SO4	TOC/COD •	Y	FF8300 WITH	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	.45MICRON FILTER	✓
1	CONU	125	NONE	SOLIDS/TD •	N		✓
				Note: Seal # was 193997			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1109
Signature: Michael Zarenski Seal #: 193997 Intact: Y

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1400
Signature: Michael Zarenski Seal #: 193998 Intact: Y

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LAB USE ONLY Opened By: [signature] Date: 4/15/91 Time: 1249
SHUTTLE # 891 TEMP. °C 5° SEAL # 193998 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189323 ETC Job # CA6428

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-O-W-4-O (Source Code from below) (Your Sample Point ID left justify) 9 1 0 4 1 2 (Start Date YY/MM/DD) 1 4 2 1 (Start Time 2400 hr. clock) (Elapsed Hours composite)

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	MET	1000	HNO3	METALS *	Y	QED WITH	✓
1	CLINS	125	H2SO4	TOC/COD *	Y	.45 MICRON IN-	✓
1	CONS	1000	H2SO4	NH3/TKN *	Y	* LINE FILTER	✓
1	CONL	125	NONE	SOLIDS/TD *	N	(MODEL FF800)	✓
1	UTB	40	GC/MS	TEMPERATURE missing when shuttle was checked in.			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1657
   Signature: Michael Zarenski Seal #: 189323 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1445
   Signature: Michael Zarenski Seal #: 189324 Intact: Y

'SE ONLY Opened By: Date: 4/15/91 Time: 1230

LE # 898 TEMP. °C 5° SEAL # 189324 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189321 ETC Job # CA6429

Date Sealed 91/04/05 By: ww

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA. 01801

SAMPLE IDENTIFICATION

Facility: GOLDISRT (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W (Source Code (from below)) 0W-14 (Your Sample Point ID (left justify)) 910416 (Start Date (YY/MM/DD)) 0835 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment ....(B) Surface Impoundment ...(I) Leachate Collection Sys. ...(C) Other ......(X)
Soil ...(S) River/Stream ..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ......(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	in line	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	filter,	✓
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	QED Model	✓
1	CONU	125	NONE	SOLIDS/TD ✓	N	FF 8200 used	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1113
Signature: Stephen A. Wheeler Seal #: 0189321 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1455
Signature: Stephen A. Wheeler Seal #: 189322 Intact: Yes

LAB USE ONLY Opened By: A. Stenzola Date: 4/17/91 Time: 1225
SHUTTLE # 1122 TEMP. °C 7 SEAL # 189322 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189321 ETC Job # CA6430

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIS RI (Facility/Site Code) Duplicate Sample (Optional Sample Point Descriptions)

Sample Point: X-GW-1416DUP (Source Code (from below) / Your Sample Point ID (left justify)) 910404 (Start Date (YY/MM/DD)) 1515 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS ✓	Y	Inline .45	✓
1	CONS	125	H2SO4	TOC/COD ✓	Y	filter	Recd with 1 gw drops
1	CONS	1000	H2SO4	NH3/TKN ✓	Y	model QED	✓
1	CONS	125	NONE	SOLIDS/TD ✓	N	FF 8200	Recd with a few drops
1	UTB	40	GC/MS	TEMPERATURE MISSING WHEN SHUTTLE OPENED	—	used	

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A WHEELER Date: 910409 Time: 1113
   Signature: Stephen A. Wheeler Seal #: 189321 Intact: YES

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) STEPHEN A. WHEELER Date: 91/04/16 Time: 1455
   Signature: Stephen A. Wheeler Seal #: 189322 Intact: YES 333

LAB USE ONLY Opened By: Date: 4/17/91 Time: 1225

SHUTTLE # 1122 TEMP. °C 7 SEAL # 189322 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 189319 ETC Job # CA6431

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G O L D I S R T (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: MW-10MW-19 (Source Code (from below), Your Sample Point ID (left justify)) 91 04 11 16 (Start Date (YY/MM/DD)) 1 0 3 0 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill (Y/N)	Observations	Observations
1	MET	1000	HNO3	METALS •	Y	QED with	✓
1	CONS	125	H2SO4	TOC/COD •	Y	AS Micron in-	✓
1	CONS	1000	H2SO4	NH3/TKN •	Y	LINE FILTER	✓
1	CONU	125	NONE	SOLIDS/TD •	N	(MODEL FF8000)	✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1647
   Signature: Mike Zarenski Seal #: 189319 Intact: Y
2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:
3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:
4. Shuttle Sealed By: (print) Mike Zarenski Date: 91/04/16 Time: 1450
   Signature: Mike Zarenski Seal #: 189320 Intact: Yes

LAB USE ONLY Opened By: D. Stanley Date: 4/17/91 Time: 1245

SHUTTLE # 694 TEMP. °C 6 SEAL # 139320 COND. Sealed 335

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 198997 ETC Job # CA6450

Date Sealed 91/04/05 By: MW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|I|S|R|T| (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W14 (Source Code (from below) / Your Sample Point ID (left justify)) 91|04|12 (Start Date (YY/MM/DD)) 1330 (Start Time (2400 hr. clock)) - (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS	N		✓
				Seal # on			
				shuttle was			
				193997			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/9/91 Time: 1109
   Signature: Michael Zarenski Seal #: 193997 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1400
   Signature: Michael Zarenski Seal #: 193998 Intact: Y

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LAB USE ONLY Opened By: Golder Date: 4/15/91 Time: 1249

SHUTTLE # 891 TEMP. °C 50 SEAL # 193998 COND. Intact

ETC Environmental Testing and Certification Corp.

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Seal No. 193995 ETC Job # CA6452

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIISRT (Facility/Site Code) Equipment Blank (Optional Sample Point Description)

Sample Point: X - 01EGB (Source Code (from below) - Your Sample Point ID (left justify)) 910404 0411 (Start Date (YY/MM/DD)) 1400 (Start Time (2400 hr. clock)) ma 4/12/91 (Elapsed Hours (composite))

Source Codes:
Well ..(W) Outfall.......(O) Bottom Sediment ....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)
Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility ......(T) Lake/Ocean ....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS ✓	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) STEPHEN A. WHEELER Date: 910409 Time: 1125
Signature: Stephen A. Wheeler Seal #: 0193995 Intact: YES

2. I have received these materials in good condition from the above person.
Name: mike Zarenski Signature: michael Zarenski
Date: 4/11/91 Time: 0815 Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/11/91 Time: 1645
Signature: michael Zarenski Seal #: 19399_ Intact: Y

LAB USE ONLY Opened By: A. Bessler Date: 4/12/91 Time: 1200
SHUTTLE # 631 TEMP. °C 70 SEAL # 193996 COND. Intact

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ETC Environmental Testing and Certification Corp.

ORIGINAL

Seal No. 189315 ETC Job # CA6454

CHAIN OF CUSTODY FORM (CC1)

Date Sealed 91/04/05 By: WW

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: Phone: (617) 938 - 0930

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: G|O|L|D|1|S|R|T|1 (Facility/Site Code) (Optional Sample Point Descriptions)

Sample Point: W-0W418 (Source Code (from below), Your Sample Point ID (left justify)) 910404 (Start Date (YY/MM/DD)) 0920 (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill. (Y/N)	Observations	Observations
1	MET	1000	HNO3	TOTAL METALS •	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) Mike Zarenski Date: 4/8/91 Time: 1628
   Signature: Michael Zarenski Seal #: 189315 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
   Name: Signature:
   Date: Time: Remarks:

4. Shuttle Sealed By: (print) Mike Zarenski Date: 4/12/91 Time: 1015
   Signature: Michael Zarenski Seal #: 189316 Intact: Y

LAB USE ONLY Opened By: Date: 4/15/91 Time: 1200

SHUTTLE # 1134 TEMP. °C 5° SEAL # 189316 COND. Intact

ETC Environmental Testing and Certification Corp.

ORIGINAL

CHAIN OF CUSTODY FORM (CC1)

Seal No. 189325 ETC Job # CA6456 CA6455

Date Sealed 91/04/05 By: WW mz 4/15/91

Company: C/O INDUSTRI-PLEX SITE Attn.: GOLDER ASSOCIATES, INC.

Facility/Site: _____ Phone: (617) 938 - 0530

Address: INTERSECTION OF COMMERCE WAY & ATLANTIC AVENUE, WOBURN, MA 01801

SAMPLE IDENTIFICATION

Facility: GOLDIISRTI (Facility/Site Code) Matrix Spike (Optional Sample Point Descriptions)

Sample Point: WGWI8AMS (Source Code (from below), Your Sample Point ID (left justify)) R 10/9/12 (Start Date (YY/MM/DD)) 10/25 (0945) (Start Time (2400 hr. clock)) – ___ (Elapsed Hours (composite)) mz 4/16/91

Source Codes:

Well ..(W) Outfall.....(O) Bottom Sediment ....(B) Surface Impoundment ....(I) Leachate Collection Sys.....(C) Other .....(X)

Soil ...(S) River/Stream..(R) Generation Point ....(G) Treatment Facility .....(T) Lake/Ocean .....(L) Specify _____

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Filt. (Y/N)	Observations	Observations
1	MET	1000	HNU3	TOTAL METALS	N		✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) mike Zarenski Date: 4/8/91 Time: 1706 mz 1706
   Signature: Michael Zarenski Seal #: 189325 Intact: Y

2. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

3. I have received these materials in good condition from the above person.
   Name: _____ Signature: _____
   Date: _____ Time: _____ Remarks: _____

4. Shuttle Sealed By: (print) mike Zarenski Date: 4/12/91 Time: 1116
   Signature: Michael Zarenski Seal #: 189326 Intact: Y

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LAB USE ONLY Opened By: A. Stender Date: 4/15/91 Time: 1210

SHUTTLE # 59 TEMP. °C 6° SEAL # 189326 COND. Intact

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6429

Sample Point [W] [01W-1416] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910419	0914	15	16.13	17.0 -> Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y(N)] (Procedure/Proportions)

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Depth to Ground water (ft) 3.76

Groundwater Elevation (ft msl) *

Well Depth (ft) 13.5

Sample Depth (non-well) (ft)

FIELD PARAMETERS OBTAINED AFTER SAMPLING EVENT DUE TO EQUIPMENT PROBLEMS

	ph		spec. cond.		other parameter	value	units
1st	6.81 (STD)	1st	1000	um/cm at 25° C	EH	87	mV
2nd	6.89 (STD)	2nd	1000	um/cm at 25°C	EH	84	mV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

Sample Temp: 5.4 (°C)

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Slightly Turbid, no odor

Weather Conditions: Sunny, 50° F, calm

Other: well developed from 4/5/91 -> 4/12/91, 32 gallons removed

* Information not Available, well not surveyed.

4" diameter well = .652 gal/ft

Purge Volume = (13.5' - 3.76)(.652)(3) = 19.05 gallons

Well purged dry and was allowed to recover before Sampling

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) Mike Zarenski Employer: Golder Ass

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/16/91 (Date) Michael Zarenski (Signature) 332

ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA6430

Sample Point [X] (Source Code) OW-A16DUP1 (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
910414	0915		16.13	17.0 → Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other (SPECIFY OTHER)

Sample Composited [Y/N]

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) *

Depth to Ground water (ft) 3.76

Groundwater Elevation (ft msl) *

Well Depth (ft) 13.5

Sample Depth (non-well) (ft)

FIELD PARAMETERS OBTAINED AFTER SAMPLING EVENT DUE TO EQUIPMENT PROBLEMS

	ph		spec. cond.		other parameter	value	units
1st	10.13 (STD)	1st	1800	um/cm at 25°C	EH	130	MV
2nd	10.11 (STD)	2nd	1800	um/cm at 25°C	EH	129	MV
3rd	(STD)	3rd		um/cm at 25°C			
4th	(STD)	4th		um/cm at 25°C			

18.4 (°C) Sample Temp

Turbidity NTU

FIELD COMMENTS

Sample Appearance: Slightly Turbid, no oder

Weather Conditions: Sunny, 50°F Calm

Other: This is a duplicate sample from OW-46 taken immediately after sampling of OW-46 using the same filter, ~~bailer~~ bailer and filtering device.

Purge Volume = (13.5 - 3.76)(.652)(3) = 19.05 gallons

Well Purged dry after 17.0 gallons

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Mike Zarenski (Print) Employer: Golder Ass

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

4/16/91 Michael Zarenski (Date) (Signature)

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ORIGINAL

ETC

FIELD PARAMETER FORM (CC2)

Form 0002
Sample Management
12/89

ETC JOB # CA643I

Sample Point [W] (Source Code) [0W-19] (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)
91 04 15	10 15 15		11 6 18	13 10 → Dry

SAMPLING METHOD:

Sampler Type [E] — A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other (SPECIFY OTHER)

Sampler Material [A] — A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other (SPECIFY OTHER)

Tubing Material [NA] — A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other (SPECIFY OTHER)

Sample Composited [Y (N)] — Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl): 6 8 8 8

Depth to Ground water (ft): 9 5 9

Groundwater Elevation (ft msl): 5 9 2 9

Well Depth (ft): 128.914

Sample Depth (non-well) (ft):

	ph		spec. cond.		(other parameter)	value	units
1st	7.64 (STD)	1st	1810 um/cm at 25°C		EH	157	mV
2nd	7.61 (STD)	2nd	1810 um/cm at 25°C		EH	158	mV
3rd	(STD)	3rd	um/cm at 25°C				
4th	(STD)	4th	um/cm at 25°C				

Sample Temp: 91.0 (°C) 3 subsequent

Turbidity: NTU

FIELD COMMENTS

Sample Appearance: Reddish color, slight odor

Weather Conditions: SUNNY, SLIGHT BREEZE, ~56°F

Other: field Parameters recorded after sampling due to meter problems

7.48 gallons / ft³

h = water column

Purge Volume = $\pi r^2 h \cdot 7.48$ = 168 gallons

well purged dry @ 310 gallons

Purged with Submersible Pump

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: STEPHEN A. WHEELER (Print) Employer: GOLDER ASSOC. INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

91/04/16 (Date) Stephen A. Wheeler (Signature)

ORIGINAL

APPENDIX F

CLP Data Validation Narrative

INDUSTRI-PLEX SITE
ARSENIC PIT/CHROMIUM LAGOON
GROUNDWATER INVESTIGATION

CLP Data Validation Narrative

1.0 INTRODUCTION

Golder Associates Inc. (Golder) has performed a data validation of the Inorganic analytical data from the observation well samples collected from April 11 through 18, 1991 at the Industri-Plex Site in Woburn, Massachusetts. These samples were collected for the Arsenic Pit/Chromium Lagoon Groundwater Investigation conducted as part of the Pre-Design Investigation (PDI) at the Site. The samples were analyzed for the Metals portion of the Inorganic Target Analyte List (TAL) in accordance with the Contract Laboratory Program (CLP) Inorganic Statement of Work (SOW) dated 7/88. The analyses were performed by Environmental Testing and Certification (ETC) Corp. of Edison, New Jersey (referred to as Laboratory). Both filtered and unfiltered samples were collected from twenty-two (22) primary locations to analyze for dissolved metals and total metals, respectively. Two (2) locations were sampled in duplicate yielding four (4) Field Duplicate samples (2 filtered and 2 unfiltered). Extra sample volume was collected from two (2) of the primary locations to obtain sufficient sample volumes to perform the analysis of the Matrix Spike/Matrix Spike Duplicate (MS/MSD) pairs. The sample points are summarized in Table 1.

Data Validation was performed in accordance with the U.S. Environmental Protection Agency (USEPA) Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (June 13, 1988 and modified February 1989). In addition, the Data Validation criteria from the Quality Assurance Project Plan (QAPjP) for the PDI were followed. When differing guidelines were encountered, the data validator used the more conservative (stricter) guideline. Data qualifiers are defined in Table 2.

The Laboratory had been provided with the quality control (QC) criteria set forth in the QAPjP and was to have prepared and analyzed Matrix Spike Duplicate (MSD) samples and Duplicate Control Samples (DCS). Although sufficient sample volume was collected to perform the MSD analysis, the Laboratory analysts followed the 7/88 SOW and performed Duplicate Sample analysis rather than MSD analysis. Additionally, the Laboratory analyzed Laboratory Control Samples (LCS) at the frequency specified within the 7/88 SOW. However, the analysis of the DCS pairs was not performed. Although some of these additional QC samples specified within the QAPjP were not analyzed, the Laboratory did follow the 7/88 SOW and performed analysis of all QC samples specified therein.

2.4 Blanks

In evaluating the contaminants in the laboratory preparation blanks (PBW), the Initial Calibration Blanks (ICB), and the Continuing Calibration Blanks (CCB), the data validator determined the appropriate action levels (as specified in the USEPA Region I Data Validation Guidelines) from the associated blank having the highest level of contamination and applied these action levels to all of the associated samples within the analytical sequence. In evaluating the contaminants in the field blanks, the data validator applied the results from the filtered field blanks to the filtered samples and the results from the unfiltered field blanks to the unfiltered samples. When the same contaminant was present in the field blank as in the preparation and/or analysis blanks, the highest level of contamination was used to determine the action level.

Please note that sample volumes and dilution factors have been taken into consideration when applying the appropriate blank action levels to the samples.

Various contaminants were detected in the blanks analyzed with the filtered samples reported in SDG 000600. Potassium, Arsenic, Iron, Copper and Manganese were detected in the laboratory blanks at negative absorbances thereby causing sample results which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Lead, Barium, Beryllium, Calcium, Iron, Magnesium, Sodium, Zinc, Arsenic, Manganese and Mercury were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the filtered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

Various contaminants were detected in the blanks analyzed with the unfiltered samples reported in SDG 000600. Potassium, Arsenic, Iron, Copper and Manganese were detected in the laboratory blanks at negative absorbances thereby causing sample results which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Barium, Beryllium, Calcium, Iron, Magnesium, Sodium, Zinc and Arsenic were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the unfiltered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

which may have been negatively influenced. The non-detected results for these analytes required qualification as estimated detection limits. The positive results for these analytes required qualification as estimated values. Aluminum, Zinc, Calcium, Iron, Potassium, Copper and Arsenic were detected at various concentrations in the laboratory and/or field blanks. Action levels were determined for each analyte. Positive results in the unfiltered samples greater than the IDL, but less than the action levels, required qualification as undetected at the concentrations originally reported.

2.5 ICP Interference Check Sample

The concentrations of Dissolved Calcium and/or Dissolved Iron in samples OW-17, OW-48A and OW-40 (SDG 000600) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Barium, Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentration of Dissolved Sodium in sample OW-17 was significantly greater than the suspected interference level and did not require qualification. The concentration levels of Dissolved Calcium and/or Dissolved Iron also produced suspected negative interferences with Antimony and Cadmium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

The concentrations of Total Calcium and/or Total Iron in samples OW-17, OW-48A and OW-40 (SDG 000600) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Barium, Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentrations of Total Sodium in samples OW-17 and OW-48 were significantly greater than the suspected interference level and did not require qualification. The concentration levels of Total Calcium and/or Total Iron also produced suspected negative interferences with Antimony and Cadmium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

The concentrations of Total Calcium in samples OW-42 and OW-50 (SDG 000613) were greater than 50% of their respective levels in the Interference Check Samples (ICSA). These concentrations produced suspected positive interferences with Beryllium, Copper, Manganese, Potassium, Sodium, Vanadium and Zinc. Positive results less than or equal to the suspected interference levels required qualification as undetected (U) at the concentration originally reported. Positive results greater than the suspected interference levels required qualification as estimated values (J). The concentration of Total Zinc in sample OW-50 was significantly greater than the suspected interference level and did not require qualification. The concentration levels of Total Calcium also produced suspected negative interferences with Antimony and Barium. Positive results for these analytes required qualification as estimated values (J). Non-detected results for these analytes required qualification as estimated detection limits (UJ).

2.6 Matrix Spike Recoveries

Seven (7) primary samples {OW-48A (filtered and unfiltered) OW-18A (filtered and unfiltered) OW-42 (filtered) OW-44 (unfiltered) and OW-44 (filtered for Mercury only)} were used for Matrix Spike (MS) analysis. There were several analytes which did not meet the Contract Required Recovery criteria as specified in the SOW and the QAPjP. The actions resulting from the assessment of the MS data for filtered samples apply to all of the filtered samples for this task. The actions resulting from the assessment of the MS data for unfiltered samples apply to all of the unfiltered samples for this task.

Samples OW-42 and OW-44 were not designated for MS analysis by the sampler. It was determined by the Laboratory that additional MS samples were required to meet analytical batch QC requirements and the analysts chose to use these samples.

The MS recovery of Dissolved Selenium for OW-18A was greater than 125%. The MS recoveries of Dissolved Selenium for OW-48A and OW-42 and Dissolved Mercury for OW-18A were less than 75% but greater than 30%. The positive results for Dissolved Selenium and Dissolved Mercury in the unfiltered samples required qualification as estimated values (J). The non-detected results for Dissolved Selenium and Dissolved Mercury in the unfiltered samples required qualification as estimated quantitation limits (UJ).

The MS recoveries of Total Selenium for OW-48A and OW-44 and Total Lead and Total Mercury for OW-18A were less than 75% but greater than 30%. The positive results for Total Selenium, Total Lead and Total Mercury in the unfiltered samples required qualification as estimated values (J). The

2.9 Furnace Atomic Absorption Results

Total Arsenic analysis by Graphite Furnace Atomic Absorption (GFAA) was performed for all samples except OW-47, OW-43, OW-37, OW-45 and OW-12 which were analyzed by ICP. The post digestion spike recoveries for the remaining samples met the 85%-115% criteria.

Samples OW-46, OW-46DUP, OW-17, OW-38, OW-40 and OW-48 required analysis for Total Arsenic using the Method of Standard Addition (MSA). All criteria for MSA analysis were achieved.

Dissolved Arsenic analysis by GFAA was performed for all samples except OW-47, OW-43, OW-37, OW-45 and OW-12 which were analyzed by ICP. The post digestion spike recoveries for OW-22, OW-44 and 02EQB did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values.

Samples OW-46, OW-46DUP, OW-17, OW-14 and OW-48 required analysis for Dissolved Arsenic using MSA. All criteria for MSA analysis were achieved.

Total Selenium analysis by GFAA was performed for all samples. The post digestion spike recoveries for OW-46, OW-46DUP, OW-9, OW-17, OW-38, OW-48, OW-48A, OW-18A, OW-37, OW-50A, OW-18, OW-49, OW-49DUP, OW-44, OW-50 and OW-49A did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values. The non-detected results for this analyte required qualification as estimated detection limits.

Samples OW-14, OW-40, OW-43 and OW-45 required analysis for Total Selenium using MSA. All criteria for MSA analysis were achieved.

Dissolved Selenium analysis by GFAA was performed for all samples. The post digestion spike recoveries for OW-46, OW-46DUP, OW-9, OW-17, OW-38, OW-48, OW-48A, OW-18A, OW-47, OW-50A, OW-18, OW-22, OW-49DUP, OW-44, OW-42, OW-50 and OW-49A did not meet the 85%-115% criteria. The positive results for this analyte required qualification as estimated values. The non-detected results for this analyte required qualification as estimated detection limits.

Samples OW-14, OW-40 and OW-43 required analysis for Dissolved Selenium using MSA. All criteria for MSA analysis were achieved.

2.11 Detection Limit Results

All criteria for Instrument Detection Limits and Reporting Requirements were met by the Laboratory.

2.12 Sample Results

All sample results were within the linear range for ICP analysis and within the calibration range for Graphite Furnace Atomic Absorption analysis and Mercury analysis.

TABLE 1 (continued)

CLP Sample Point Identifications for PDI Arsenic Pit/Chromium Lagoon Groundwater Investigation Samples

Total Metals

Sample Point ID	ETC ID	SDG
OW-14	CA6450	000600
OW-17	CA6451	000600
01EQB	CA6452	000600
OW-38	CA6453	000600
OW-48	CA6454	000600
OW-48A	CA6455	000600
OW-48AMS	CA6455MS	000600
OW-48AMSD	CA6455MSD	
OW-40	CA6458	000600
OW-46	CA6459	000600
OW-46DUP	CA6460	000600
OW-9	CA6461	000600
OW-47	CA6462	000612
OW-43	CA6463	000612
OW-37	CA6464	000612
OW-22	CA6465	000612
OW-50A	CA6466	000612
OW-18	CA6468	000612
OW-18A	CA6469	000612
OW-18AMS	CA6469MS	000612
OW-18AMSD	CA6469MSD	
OW-45	CA6471	000612
OW-44	CA6472	000613
OW-49	CA6473	000612
OW-49DUP	CA6474	000612
OW-12	CA6475	000613
OW-42	CA6476	000613
OW-50	CA6565	000613
OW-49A	CA6566	000613
02EQB	CA6594	000613

APPENDIX G

Non-CLP Data Assessment

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF OVERALL DATA QUALITY
FOR TASK 37

PERFORMED BY: **Lori Anne Hendel** Lori Anne Hendel DATE: **July 8, 1991**

	YES/NO/NA
1. Were the QAPjP, laboratory reports, and field documentation available to support data assessment procedures?	yes
2. Precision:	
Are DCS RPD within control limits?	yes@
Are lab duplicate RPD within control limits?	yes@
Are field duplicate RPD within control limits?	no@
Are MS/MSD RPD within control limits?	yes@
Overall assessment of precision @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. Overall, the precision of the measurements is acceptable for this task.	
3. Accuracy:	
Is absolute recovery within control limits for DCS?	yes@
Is relative recovery within control limits for MS/MSD?	yes@
Overall assessment of accuracy @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. Overall, the accuracy of the measurements is acceptable for this task.	
4. Representativeness:	
Were procedures in the FSP followed?	yes
If not, were procedural variations approved and documented?	N/A
Were sample preservation procedures given in the FSP followed?	yes
Were data reported in the proper units?	yes
Was blank contamination not evident or well documented at low levels?	yes@
Were field duplicates within control limits?	no@
Overall assessment of representativeness @ Not in all cases; refer to Assessment of Laboratory Performance form for particulars. The qualified data represents conditions at the Site.	

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF LABORATORY PERFORMANCE
FOR TASK 37

LABORATORY: **ETC Corp./ Chyun Associates** REPORT #: **000600, 612, 613**

VALIDATED BY: **Lori Anne Hendel** DATE: **July 8, 1991**

		YES/NO/NA
1.	Release authorization with signature present?	yes
2.	Sample identification summary/description present?	N/A
3.	Analytical results present, including:	yes
	correct units?	yes
	detection limits?	yes
	method used?	yes
	date sampled?	yes
	date received?	yes
	date prepared?	yes
	date analyzed?	yes
	dilutions noted?	yes
4.	Holding times met?	yes*
5.	Lab duplicate RPDs within control limits (20%)?	yes^
	Field duplicate RPDs within control limits (30%)?	no^^
6.	MS/MSD % recoveries within control limits (75-125%)?	yes#
7.	MS/MSD RPDs within control limits (30%)?	yes##
8.	Duplicate control sample (DCS) accuracy within given control limits (80-120%)? **(Blank Spikes)**	yes@
9.	DCS precision within given control limits (20%)?	yes@@
10.	Method blanks "clean"?	yes
11.	Chain-of-Custody present and complete with signatures and dates?	yes
12.	Name of analyst/supervisor given?	yes
13.	Procedural deviations noted?	yes
14.	QC procedures given?	N/A

INDUSTRI-PLEX PRE-DESIGN INVESTIGATION

ASSESSMENT OF FIELD PERFORMANCE
FOR TASK 37

SAMPLER/ORGANIZATION: Michael J. Zarenski (Golder)
Stephen A. Wheeler (Golder)
REPORT #: 000600, 612, 613

VALIDATED BY: Lori Anne Hendel
DATE: July 8, 1991

	YES/NO/NA
1. Does field documentation include:	
date/time samples collected?	yes
sample location?	yes
name of sampler?	yes
field measurements?	yes
sampling method?	yes
instruments/methods for field measurements?	yes
calibration/maintenance of field instruments?	no^
sampling containers used (COC*)?	yes
sample preservation procedures (see COC*)?	yes
Chain-of-Custody procedures?	yes
field quality control procedures?	yes
2. Were procedures in the Field Sampling Plan followed?	yes
If not, were procedural variances approved and documented?	N/A
3. Was contamination of field blank samples not evident, or well documented at low levels?	yes+
4. Are field duplicates within control limits?	no=

5. Comments: ^ Per the instructions of the Task Manager, Redox Potential (Eh) was measured using an ORP Probe which was not calibrated daily. pH and specific conductivity meters were properly calibrated on a daily basis.

\+ Low level metals were detected in the equipment blanks. Also, Ammonia and Total Kjeldahl Nitrogen at 3.7 mg/l each, and Total Dissolved Solids at 56 mg/l.

= Field Duplicate RPDs were out-of-control for the following:
OW-46 - TOC (108%)
OW-49 - Ammonia (62%) and Total Kjeldahl Nitrogen (101%)

* Chain-of-Custody Form